MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXIII. Published every Thursday at 418-19 Perry-Payne Bldg., by the Marine Review Pub. Co. CLEVELAND, O., MAY 16, 1901. Subscription $3.00 a year. Foreign $4 50 a year. No. 20

CANADIAN ORES.

It is quite evident that the product of Canadian iron mines is to play a more important part in ore business of the lakes this season than was expected. M. A. Hanna & Co. of Cleveland, who have the agency for the Helen mine at Michipicoten, just above Sault Ste. Marie, which is controlled by Francis H. Clergue of Sault water power fame, have sold ore up to the limit of what can be spared from that mine after the requirements of Canadian furnaces at Midland, Ont., are provided for. A couple of cargoes from Michipicoten were among the first to be delivered at Lake Erie ports this week. Four steamers of the Algoma Steamship Co. (a Clergue organization) which went to Europe when navigation closed on the lakes last fall, are again on their way up from Montreal to the Sault with cement and other materials that will be required in the construction of manufacturing plants under way at that point. The vessels are the Monkshaven, Leafield, Theano and Paliki. They will be used during the present season in carrying ore from Michipicoten to Midland and other Canadian ports. The Clergue railway to the Helen mine, twelve miles northeast of Michipicoten, is being extended twelve miles more to reach the newer Josephine mine, which has been opened the past few months. It is a bessemer ore said to be of better grade than the Helen. Some ore will very probably be shipped from this second mine during the present season. It is not improbable that a second ore dock will have to be built at Michipicoten.

At Fort William, Ont. (head of Lake Superior), an ore dock will probably be built next spring, if not during the present season, for the transfer of ore that is to come over the Canadian Pacific railroad from the Atikokan range, just across the Minnesota border. These mining properties will probably be controlled by the United States Steel Corporation, as they were taken under option last fall by the American Mining Co. (American Steel & Wire), now a part of the steel corporation, at a price understood to have been $500,000. If the ore is carried by the Canadian Pacific it will be necessary to construct about 45 miles of road in addition to the ore dock at Fort William. It is understood that a rate of less than 75 cents a ton has been guaranteed by the road, and the lake rate will be about equal to that from Duluth.

CONSOLIDATED MILWAUKEE COAL COMPANIES.

Five leading coal concerns of Milwaukee, which were consolidated a few days ago, control eleven docks, and it is said that the dock property under the new organization will be materially improved. It is also announced that as a result of the consolidation better dispatch can be given to lake vessels delivering coal at Milwaukee. The title of the new corporation is Milwaukee-Western Fuel Co. and the capital is $2,000,000. The five concerns entering the consolidation are the B. Uhrig Fuel Co., H. M. Benjamin Coal Co., E. P. Elmore Coal Co., F. R. Buel Coal Co., and George S. Eastman. The officers are: Chairman of board of directors, H. M. Benjamin; president, Edward A. Uhrig; first vice-president, Eltinge Elmore; second vice-president and general superintendent, Lawrence Demmer; treasurer, C. W. Moody; secretary, F. R. Buel; assistant superintendent, George S. Eastman. Headquarters will be in offices that have been occupied by the B. Uhrig Fuel Co. Business of the five concerns in the consolidation last year amounted to about 350,000 tons of anthracite coal, and 750,000 tons of bituminous coal. The new company will represent the following anthracite companies: Delaware, Lackawanna & Western Railway Co., Scranton coal; W. L. Scott Co., and the Delaware & Hudson Canal Co., Lackawanna coal. The consolidation will also have the exclusive sale of Pocahontas coal for Wisconsin, and will handle all other grades of bituminous coal, including Youghiogheny, Hocking, West Virginia, Illinois, Indiana, etc., and also all kinds of woods for fuel.

Since the organization of the United States Steel Corporation there has been some uncertainty regarding the future of the Lake Carriers' Association. It was not known what position the management of the Steel Corporation fleet would take regarding an association that included such diversified interests as the line boats of Buffalo and the individual vessel owners. The matter was very positively settled at a meeting in Cleveland Tuesday. Vessels of the Steel Corporation will all have membership in the association and every effort will be made to work in harmony, not only with line boat interests of Buffalo but also with the so-called individual owners. The policy of the organization, or rather the different interests within the organization, on the question of wages will soon be more clearly defined than it has in the past—certainly before another season of navigation comes around.

Directors of the Oliver Iron Mining Co., the Lake Superior Iron Co. and the Regent Iron Co., components of the United States Steel Corporation, at a meeting last week, received and accepted the resignation of Henry W. Oliver, president, and D. G. Kerr, vice-president, of the three companies. T. F. Cole, general superintendent of the Oliver Iron Mining Co., was elected to succeed Mr. Oliver as president in all the companies, with the additional title of general manager. Nelson P. Hulst was elected vice-president and general mining engineer. Both officers will have headquarters in Duluth. These changes are incident to the general reorganization of the executive staffs of the various companies controlled by the United States Steel Corporation.

It is reported that negotiations are under way for the consolidation of the Cramp Ship & Engine Building Co., Vickers' Sons & Maxim and the Bethlehem Steel Co., although confirmation cannot be obtained. The report, printed in Philadelphia, is that the majority stockholders of the Bethlehem Steel Co. have given options upon their stock to the Cramps-Vickers companies and that the minority may be admitted upon the same terms.

LAKE FREIGHT SITUATION.

When it was not known, a short time ago, that a strike of marine engineers and an ice blockade in the St. Clair river would delay the opening of lake navigation so that almost a month's capacity of the fleet would be lost, as compared with the long season of 1900, a very low range of lake freights was expected for the present season. It was estimated that if conditions involved in the movement of freight were equal to last year the excess of carrying capacity for 1901 would be about 6,000,000 tons. The situation has been so changed, however, that the vessel owners seem warranted in turning down ore and coal freight contracts that would certainly have been accepted some time ago. Ore for the full season is being offered at 75 cents from the head of lake Superior, and coal at 35 cents from Ohio ports to the head of the lakes, but these rates have not as yet been accepted very freely. Officials of the Steel Corporation, who took about 2,500,000 tons of vessel capacity a few weeks ago on a basis of 80 cents for the full season from the head of the lakes, are now offering only 70 cents to Oct. 15. The 2,500,000 tons provided quite fully for their requirements outside of their own vessels, so that they will not, of course, be hard pressed by requiring a large amount of additional capacity, and will probably, therefore, take chances on the outcome of the season if they do not succeed in getting vessels on the reduced basis. In the meantime, the starting of shipments in both ore and coal has been so slow that the shippers are satisfied as regards wild rates to let well enough alone and are paying on ore from day to day 80 cents from the head of Lake Superior and 60 cents from Escanaba, with 40 cents on coal to practically all the upper lake ports. Strength of the market from the vessel owner's standpoint is based mainly on the fact that to June 1 the ore shipments will certainly not exceed 1,500,000 tons, against 3,265,000 tons on June 1 a year ago, and also upon the enormous output and consumption of pig iron. A decline in pig iron production started early last year. Now the turn is in the other direction. The furnaces have exceeded for the first time in the history of the country the 300,000-ton weekly mark. The pig iron output is now on a basis of about 15,600,000 tons annually with consumption above 16,000,000 tons.

CONSTITUTION TO BE TRIED NEXT WEEK.

The Constitution, it is expected, will have her first trial next week and it is the wish of all interested in the yacht that it will be either on Monday or Tuesday. The delay is caused by the steel gaff not being ready. This spar is being made as fast as possible at the Herreshoff works and W. B. Duncan, Jr., hopes that it will be ready by Saturday. If it is finished then it will be shipped at once and the sails bent the first fine day afterward. If the boat goes out on Monday it will be for the benefit of the builders. N. G. Herreshoff always has the wheel on the first sail of a boat built at the Bristol shops and then when everything is satisfactory to him he turns the yacht over to the owners. W. B. Duncan, Jr., has gone to Bristol. He said that he had no idea when the gaff would be finished, but he hoped that it would be this week.

"If the gaff is finished by Saturday night it will be shipped at once, but even if this is done I cannot say when the trial will be, because we will not bend on the sails in the rain, as they would be spoiled. I think that the first time the Constitution sails will be on next Monday or Tuesday and after that she will go out every day to get her in trim and drill the crew. The first race against the Columbia will be sailed on June 15 off Newport. The two yachts will not meet until the new one is in proper shape and then they will be raced for all they are worth. The Columbia is a very fast boat. She has been tried and is in good trim, so that it would be foolish to put the Constitution against her until the new defender is in condition for a hard race."

When asked what he thought of the defeat of the challenger by the old Shamrock, Mr. Duncan said: "I know nothing about the conditions. It was not a race, but only a trial, and no one knows what they were doing on the two boats. I do not think that the new boat can be in condition yet for a hard race and they probably favored her during the trial. We shall know more about the Shamrock II. when she meets other yachts in a regular race."

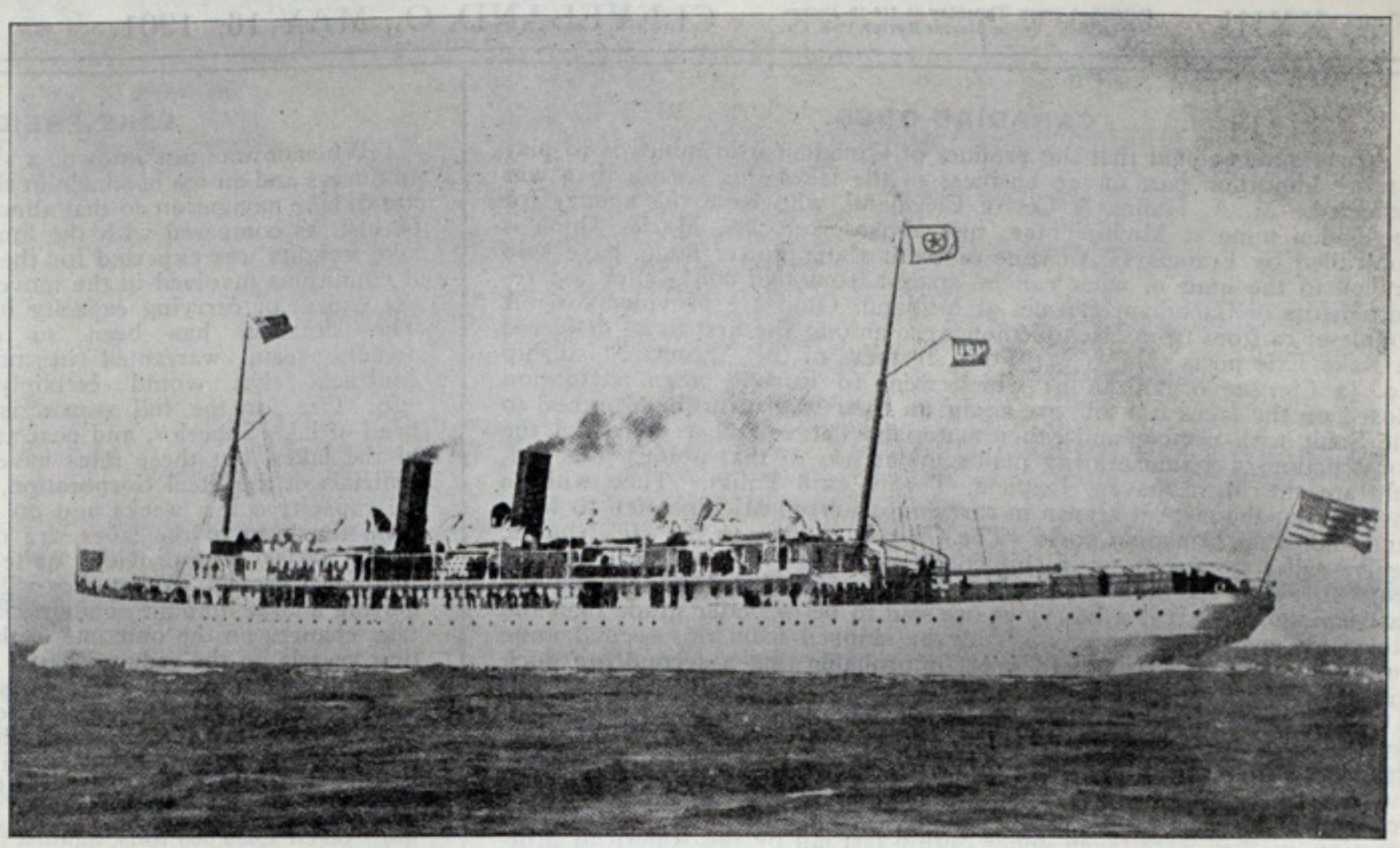
SHAMROCK II. BEATEN BY SHAMROCK I.

Shamrock I. and Shamrock II. had a brush over a triangular course of about twenty miles on Monday of this week and the new cup challenger was beaten by the old yacht by 5 minutes and 5 seconds. The result, however, is minimized on the ground that the challenger's mainsail was defective, but it is nevertheless disappointing. Yachtsmen generally throughout the United States think that no importance is to be attached to the trial between the two Shamrocks. It was blowing hard, according to the reports, and the sea was running high. The old Shamrock is a tried boat and was able to race under the conditions, while the new Shamrock has not had enough sails to stretch her rigging and it would have been folly to have pushed her under the circumstances. Then, too, the theory is advanced that the yachts were not racing at all, but were merely sail stretching.

Mr. Charles M. Schwab is making a tour of the properties of which he is the executive head. Incidentally in a talk at Youngstown he revealed what is to be the administrative policy of the great corporation. He said that it was not the purpose of the general management to interfere with the individual management of the various plants. The responsibilities for the operation of the various concerns rest directly upon the presidents of the constituent companies. As a general thing the presidents of the constituent companies will have full power in their particular fields, but the general policy of the corporation will be directed by the executive committee from New York. Where two companies produce the same product one sales office will be established for both.

AROUND THE WORLD IN SIXTY-TWO DAYS.

Jules Verne wrote a story, "Around the World in Eighty Days," which was regarded as a flight of fancy at the time and no one ever dreamed when the story came out that such a thing could be possible. It is not generally known but there is a schedule trip now around the world in sixty-two days and thus is Jules Verne outdone by prosaic fact. Atlantic greyhounds and American overland expresses now admit of the following mail schedule every three weeks: London to San Francisco, eleven days; Honolulu, sixteen days; Samoa, twenty-two days; Auckland, twenty-seven days; and Sydney, thirty-one days. The A. & A. line, co-operating with the great steamship companies which ply to the Antipodes via the Suez and the Cape, has established a series of "Round the World" routes which are almost certain to meet the requirements of the most fastidious passengers. This service is greatly facilitated by the steamers which the Oceanic Steamship Co. has lately placed upon the route from San Francisco to Sydney and Auckland. These are the Sierra, Sonoma and Ventura, built by the Cramps, Philadelphia. A picture of the Sierra was published in the ship building edition of the Review (Feb. 7, 1901). A picture of the Sonoma is shown in this issue. The vessels are 425 ft. by 50 ft. by 21 ft. and are the only twin-screw vessels in the Pacific-Australasian trade. This trip around the world can be made for $685, exclusive of the cost of a berth across the American continent.



SONOMA OF THE OCEANIC STEAMSHIP CO.'S FLEET.

MR. SCHWAB BEFORE THE INDUSTRIAL COMMISSION.

HE TESTIFIES IN AN EASY MANNER REGARDING THE CORPORATION OF WHICH HE IS PRESIDENT.

The center of the stage during the present week has been held by Mr. Charles M. Schwab, president of the United States Steel Corporation. He has appeared in public twice during the week and in the magazines once. His testimony before the industrial commission at Washington was exceedingly interesting. Mr. Schwab was approached the night prior to the hearing to ascertain whether he had prepared any part of his testimony, and it was found that he had not. He relied entirely upon the moment to answer the questions, being satisfied that the commission could ask no question that he could not answer off hand. His testimony, therefore, was quite spirited and doubly interesting. Mr. Schwab is a thorough believer in the corporation of which he is the executive head, and he predicts lower prices for the company's products to the consumer.

Mr. Schwab first spoke of the Carnegie Co., of which he has been president for the five years preceding the formation of the United States Steel Corporation. The Carnegie company, he said, mined nearly all its own ore—about 6,000,000 tons a year—carried a large portion of this tonnage on its own boats on the lakes, and transported practically all of the ore used in its manufactures over its own railroad—the Pittsburg, Bessemer & Lake Erie—to the works at Pittsburg. He said that it had not been the practice of the Carnegie company to sell its ore to other companies, but to manufacture the different grades into a great variety of products. That company alone controlled 25 per cent. of the ore of the country and accounted for a like percentage of the finished product. On some specific manufactures of steel the portion of the output controlled by the Carnegie company was greater—in structural work about 50 per cent., steel rails 30 per cent. and armor plate more than 50 per cent.

There had originally been twenty-seven companies in the Carnegie interests, a majority of the stock in each company being owned by the Carnegie company proper. It was found, however, that even with a controlling interest of the stock these numerous companies were hard to control and to keep together along one general line of policy. They were, therefore, merged under a centralized management. The resulting concern was more like a partnership affair than a stock company. The stock, he said, was $1,000 a share and was never listed, which practically prevented trading in it. The success of the consolidation was so marked, said Mr. Schwab, that it was realized that many advantages would accrue from the consolidation with the other great steel companies, and the United States Steel Corporation was formed. While the latter company was still in process of organization the advantages and savings which were expected to be realized were many. Where the individual companies heretofore had been manufacturing a varity of products they would now specialize. That is to say, one works would make steel rails, another structural work and another armor plate, and as certain grades of ores were better adapted to certain manufactures the interchange of ores among the individual concerns would tend to the betterment of the quality of the output from all.

There was a great saving also in the transportation of ores, the corporation owning 112 boats on the lakes, which under the present system could operate continuously and not wait, as they were formerly obliged to, for the product of a certain mine to be carried to a certain company. It was now also possible to distribute ore over the docks and thence over the railroads to the various works more economically. There was now also a saving in the salary of extra superintendents and of skilled and salaried help to be considered. Where there was formerly a chemist connected with each concern, each of whom might have a different process of manufacture, there was now one chief chemist for the entire company. This would result in a greater uniformity of process and consequent betterment of quality. Mr. Schwab estimated that the United States Steel Corporation now owned 75 or 80 per cent. of the known ores of the United States, and controlled a like percentage of the finished product.

Mr. Schwab explained, in response to inquiries, that the United States Steel Corporation simply owned the capital stock of the other companies and was well defined as "a clearing house of information." The individual companies continued to purchase their own supplies and to make their own sales, except in cases of two trust concerns selling the same class of product in the same territory, in which case one representative acted for both. As since the organization of the Federal, National and Carnegie companies the tendency had been to keep prices down, Mr. Schwab thought the further economies that could be effected under the centralization would tend to reduce prices still further and, despite popular opinion, would result in the long run to the benefit of consumers. High prices, he thought, reduced consumption. It was true that prices obtained abroad were lower than those obtained in the United States. The explanation for this, Mr. Schwab said, was very simple. It was the idea of the operators to run the works always full and steadily, and when times were dull, in order to attain this end it was necessary to seek a foreign market at reduced prices. In any case it was necessary to reduce prices to obtain a foreign market, and when the market was attained, which was generally the work of years, it was sometimes necessary to keep prices down in order to retain it. The laboring classes in any event were directly benefited. The rule worked both ways, foreign manufacturers selling their goods in the United States cheaper than at home.

Mr. Schwab thought a protective tariff on some classes of manufactures of steel was desirable. In industries in which labor formed the largest part of the cost it was indispensable. On pig iron and steel rails the tariff was not necessary, labor forming a small portion of their cost. If the tariff were taken off finished products, however, such as the plate and structural work, a reduction in wages would inevitably follow. The average wage paid by the Carnegie company has been greater in every year since 1892 than in any year preceding that period. Mr. Schwab considered it significant that up to the year 1892 labor organizations had existed among the company's employees. Since that year there had been no organized labor. As Mr. Schwab expressed it, no "aristocracy of labor" existed as it had prior to 1892. Then the unions dictated the wages of foremen and certain classes of employees and the company considered the figures fixed by them as unjust. Now, the lower-priced men were paid more and the high-priced men less, the general average being greater. No business could prosper, Mr. Schwab thought, subject to the dictation of a labor organization. A man was handicapped by membership in a labor organization, he said. He submerged his personality and sold his individuality for a doubtful consideration. Mr. Schwab said that the minimum wage paid in the non-union mills at Carnegie in one year, including absence for various causes, was $4 a day.

When asked by Commissioner Lichtmann as to the maximum wage paid by the Carnegie company, Mr. Schwab said that he would have to reply, as did the man in Weber & Field's company when asked what he would do for $10,000—"He was ashamed to tell."

Mr. Schwab refused to discuss J. Pierpont Morgan's purchase of the Leyland line in its relation to the carrying on of the products of the steel trust. He said, however, that he did not believe that a world combination was possible. Mr. Schwab expressed the opinion that the Babcock bill, providing for an export tax on trust-made products, would only result in an injury to the working people, for the reasons which he had given in discussing the lower prices at which American products were sold abroad than at home. Finished products being largely a question of labor, should be left alone if the laboring classes were to prosper. In summing up Mr. Schwab said that he thought industrial combinations in general were of great benefit to the consumer, the public and the workman, aided in maintaining labor in a healthy condition, and supplied the necessities of life at lower prices than was possible otherwise.

THE LARGE GRAIN FLEET AT BUFFALO.

[Special correspondence to the Marine Review.]

Buffalo, May 15.—The first special event of account in the lake season, the arrival of the Lake Michigan grain fleet, is taking place this week with fairly satisfactory results. The coming is late, but it is quite possible that there will be a full season for all that. As usual the bulk of the grain is corn and it comes from Chicago, but there is every season a further disposition to add to the importance of side ports on Lake Michigan, mostly on account of the difficulties of Chicago navigation. I note, in a list of twenty-two grain cargoes, fifteen from Chicago and seven from other ports on Lake Michigan.

There is a great amount of wet grain already developing, especially when it is reflected that practically all the low-class wooden vessels of a dozen years ago are now replaced by steel. Here are some of the reports: Steamer John Mitchell, about 3,500 bushels of wet corn, said to be the largest amount discovered yet; Selwyn Eddy, 3,200 bushels wet corn; H. S. Pickands, 1,100 bushels wet wheat; Alva, 700 bushels wet barley; Merida, 350 bushels wet corn; Italia, 225 bushels wet oats; Huron, 300 bushels wet corn, and so on. The Hadley, Hesper, Waldo, City of Bangor and Plankinton are also reported with some wet. The Plankinton received her water in putting out a fire.

What is the matter? Well, they say that altogether too much of this damage has come from faulty internal structure of the vessel. A steel vessel will wet her grain from a broken pipe just as readily as a wooden one will and there is where the complaint comes in. "You could preach a good sermon on that side of the question," said a vessel agent to me in making a report on the situation. There is not sufficient care and supervision of the loaded boats, or. what is worse, there is a defect that the cargo itself covers up till it comes out. Then the wet grain dealer smiles and gets in his work. It is estimated that about 15,000 bushels of wet grain has been reported so far and a great part of the fleet is still loaded.

At this writing there is a fleet of forty grain cargoes afloat in Buffalo harbor, aggregating a little less than 5,000,000 bushels. The elevators to the number of fifteen are at work on them, so that there will be no particular delay unless there is damaged grain to handle. Such a showing as this would have been impossible till quite lately. Not more than two or three years have the grain cargoes averaged more than 100,000 bushels, and no longer than 1890, when the steamer America came in with a straight cargo of 100,000 bushels of corn aboard, she was regarded as a great curiosity. In the present fleet of forty there are twenty-two with more than 100,000 bushels of grain, of which four exceed 200,000 bushels and two exceed 300,000 bushels. The largest cargo is in the steamer H. S. Holden, 362,000 bushels of oats, and this is not a record breaker. Such achievements now fail to excite any special attention, though there is some notion that the lake steamer has about reached its highest capacity. It is hard to be sure of this, for all previous estimate has been far exceeded year by year by the new fleets.

The grain-handling troubles appear to be over. Spite of the great amount of extra work afforded by the Pan-American construction, which has made Buffalo the strike city of the country, there has been no report of difficulty among the grain shovelers. The system, good as it appears to be, requires a strong hand to carry it out and that seems to have been found in Supt. Kennedy. Nobody doubts that the best has been done in setting up the direct system and dropping the contract system. Notwithstanding reports of no surplus wheat from the northwest, there is now quite a liberal offering of it at Duluth, so that the general movement ought to be good this year, especially if the present promise of liberal crops of wheat is carried out. JOHN CHAMBERLIN.

DULUTH AND SUPERIOR COMMERCE FOR 1900.

Capt. D. D. Gaillard, government engineer at Duluth, has prepared the annual statement of lake commerce at Duluth and Superior for the navigation season of 1900. The report is very exhaustive and is made up exclusively in tabular form. On the whole, the business of the year was a trifle greater than it was in 1899, though the valuation shows a decrease. There were received 2,361,455 tons of cargo through the Duluth canal and 723,729 tons through the Wisconsin entry. Cargo departing through the Duluth canal amounted to 6,700,713 tons and 1,939,248 through the Wisconsin entry. Wheat and other grains show a decrease of 22,998,505 bushels, with a valuation of over $18,000,000 less than 1899. Anthracite coal shows a decrease of 328,557 tons, with a valuation of over $1,700,000 less than in 1899. Iron ore shows an increase of 1,054,685 net tons over 1899. The total freight traffic of 11,725,245 tons show an increase of 117,157 tons over 1899, though a valuation of $22,034,770 less than in 1899. The total number of passengers arriving and departing was 62,993, an increase of 6,723 over 1899. The navigation season covered a period of 234 days, the first boat departing on April 18 and the first boat entering on April 20. Following is a condensed statement of the commerce of the two ports:

CONDENSED STATEMENT OF COMMERCE AT THE HEAD OF THE LAKES, DULUTH AND SUPERIOR, DURING NAVIGATION SEASONS OF 1898, 1899 AND 1900.

	1900.	1899.	1898.
Number of vessels arriving.....	5,725	5,816	5,519
Registered tonnage arriving.....	7,179,142	7,235,288	7,014,924
Number of vessels departing.....	5,609	5,710	5,351
Registered tonnage departing.....	7,207,926	7,198,213	7,120,313
Arrivals and departures, vessels...	11,334	11,526	10,870
Arrivals and departures, tonnage..	14,387,068	14,433,501	14,135,237
Receipts, net tons	3,085,184	3,091,425	2,979,809
Value of receipts.....	$32,565,381	$40,193,821	$34,578,955
Shipments, net tons.....	8,640,061	8,516,663	7,147,452
Value of shipments.....$102,543,815		$116,950,145	$108,064,065
Receipts and shipments, net tons..	11,725,245	11,608,088	10,127,261
Value of receipts and shipments...$135,109,196		$157,143,966	$142,643,020

The announcement is made that the Hamburg-American line has acquired the Atlas line, which for the past thirty years has plied between Jamaica, Hayti and Central America. The Atlas line was formerly owned by an English corporation, but as an adjunct to the Hamburg-American line will fly the German flag. The Hamburg-American line now controls 120 vessels of 630,000 tons.

A NEW ENGLAND BOAT LAUNCHED.

A most successful launch took place on Tuesday of last week at Roach's Ship Yard, Chester, Pa. Mrs. Jeanette K. Clarke of New York, a daughter of Capt. Horatio Hall, who, with a party of about 200, went over from New York on a special Pullman train, was the sponsor. The vessel is the North Star, built for the Maine Steamship Co., and resembling in a great many respects the New England coast steamers. Her length is 320 ft. 4 in.; beam, 46 ft.; depth of hold, 17 ft. 6 in.; with a gross tonnage of about 3,300 tons. She will be schooner-rigged, with steel masts, and cargo booms in the wake of her forward and after hold. Capacity for carrying 2,000 tons of freight is provided, although not interfering in the least with her passenger accommodations. There are 130 state rooms located on the saloon, main and promenade decks. As a passenger boat the North Star will be very commodious and the comfortable arrangement of the saloon, grand stairway and social hall, besides the fore-and-aft cabins and large smoking room, will add materially to the comfort of those on board. Complete toilet and lavatory arrangements are provided and the crew have convenient and roomy quarters. Ample space is given up for the propelling machinery and the boilers. The engines are triple expansion, capable of developing about 4,000 H.P., which will give the vessel a speed of about 19 miles an hour. Steam will be furnished by two single-ended Scotch boilers. The estimated cost of the North Star is about $350,000.

RAISING THE BATTLESHIP MAINE.

Mr. Newton F. Chamberlain of Chicago, who has the contract for raising the wreck of the Maine in Havana harbor, says that he believes the Maine will float as soon as they are able to patch the hole in her side. The Chamberlain company is now engaged in building a dam around the sunken vessel and as soon as it is completed the water will be pumped out and the holes patched in the vessel's hull. This company, it will be recalled, offered to raise the Maine for nothing, on condition that it be permitted to retain the wreck. Speaking of the wreck Mr. Chamberlain says:

"The machinery in the Maine does not seem to have been damaged at all. Steel does not rust until exposed to the air. As fast as the water is removed the machinery will be covered with oil to prevent corrosion. When the ship went down she had on board about $500,000 worth of ammunition, and as this is hermetically sealed in the vaults I do not apprehend that it will be at all damaged. It will take the best part of the summer to complete the dam, but within two months after it is finished I expect to have the wreck afloat. All the machinery necessary for the work is on the ground. The work on the Alfonso is further advanced, and it will take no more than a week to raise her after we get permission from the quarantine officials to resume operations."

NAVAL DEVELOPMENT IN FRANCE.

It is reported that French naval circles are rejoiced over the added admissions to the French naval school, 117 more being admitted this year than last. The naval enthusiasts decline to believe that the increase is due to the lowering of the standards of examinations for the navy but rather to the awakening interest in the service. This latter view is taken by M. Lockroy, former minister of marine in the Meline administration, who lately electrified France by revealing the astonishing maritime growth of Germany. Mr. Lockroy's remarkable article upon this subject was recently published in full in the Review. Every day the harbor at Cherbourg is crowded with persons who gather to witness the evolutions of the submarine boats, a departure in naval warfare in which France has been particularly active. It is reported that one of the submarines a week or two ago approached to within 20 ft. of the Kaiser Wilhelm der Grosse, then disappeared and reappeared within three minutes on the other side of the vessel. M. Lockroy says:

"Ever since our brilliant submarine experiments in Cherbourg, France has become recognized as a power inevitably destined to great naval preeminence. The successful submarine trials, which have been persisted in in spite of the skepticism of the rest of the world, are responsible for the increase in naval enthusiasm in France which is now quite equal to the interest taken in naval affairs in Germany and the United States."

CONSOLIDATION OF SAULT STE. MARIE COMPANIES.

A circular issued to the stockholders of the Consolidated Lake Superior Co. and the Ontario Lake Superior Co. says:

"Stockholders, common and preferred, of record on the books of said company on May 10, 1901, will receive warrants which will entitle them to purchase at par preferred stock of the Consolidated Lake Superior Co. to an amount equal to fifty per cent. of the par value of their holdings on the above date. Purchasers of preferred stock under the aforesaid warrants are entitled to receive as part of such purchase an equal amount of full paid common stock of said company. The proceeds derived from the sale and said preferred stock will be used in the construction of a large steel plant at Sault Ste. Marie, Ont., of a capacity of 2,500 tons of steel daily for the purpose of most profitably utilizing a part of the company's ore deposits and other natural resources and for such other undertakings collateral thereto as will tend to develop to the greatest possible extent the extensive and varied interests of said company."

A meeting of the stockholders of the Consolidated Lake Superior Co. will be held in New Haven, Conn., today (Thursday) for the purpose of authorizing the purchase of the stock of the Ontario Lake Superior Co.

Major Wm. H. Bixby, United States engineer at Cincinnati, opened bids on Saturday last for the building of a lock for one of the dams of the Ohio river. The Sheridan-Kirk Contract Co., Nicholasville, Ky., was the lowest bidder at $241,805. Other bids were: C. I. McDonald, Pittsburg, $332,225; Robert A. Cummings, Owensboro, Ky., $310,555; Aetna Construction Co. of Wheeling, W. Va., $269,425; Evansville Contract Co., Evansville, Ind., $302,767.50.

WATER TUBE BOILER CONTROVERSY.

A CLEAR, SIMPLE RECITAL OF THE CASE FROM AN ENGINEER OFFICER OF THE ROYAL NAVY—EXPERIENCE WILL REMEDY THE PRESENT DIFFICULTIES.

From Navy & Army, London.

The improvements in the methods of manufacturing materials used in engine and boiler construction, and the progress of the science of applied mechanics, have enabled the design of any particular portion of machinery to be accurately determined, so that the strength of each part of an engine or boiler, and the work which it has to perform, can be absolutely apportioned. This exactness in engineering methods has demonstrated the practicability of using pressures of much higher power in steam engines than it has been possible to generate in the old-fashioned "tank" or cylindrical boilers, and as the use of higher pressures of steam, coupled with the principle of expansion by which the utmost value in the shape of work can be obtained from the steam, means not only economy in the consumption of fuel required to generate the steam, but also a saving in the weight of the machinery and boilers necessary to develop a given horse power, it becomes obvious that to secure the full benefit of these advantages a different type of boiler is required. The highest steam pressures in cylindrical boilers in vessels of the royal navy have been limited to 155 lbs. per square inch, although in some ships in the mercantile marine steam of 200 lbs. pressure has been used; but for these pressures and for pressures even up to 300 lbs. to the square inch and higher, by the use of which much greater economy of fuel becomes possible, the necessary thicknesses of the shells and furnaces of the cylindrical boilers, and the sizes of their stays and rivets, to insure the necessary strength, become so great that the extra weight of boilers involved proves a practical objection to their use. In the cylindrical boiler, owing to the method by which it generates steam, all parts, including the outer shell, have to be sufficiently strong to bear the pressure. The hot gases and flame from the furnaces pass through the interiors of tubes on their way to the funnels, and so heat the large body of water which the boiler contains. In the water tube boiler the whole system is reversed; the tubes contain the water and the furnace gases are on the outside of the tubes in which the steam is generated. The shells of the boilers in the latter case have no pressure to bear; they simply confine the furnace heat and can be therefore made of very light material. The generating tubes are small in diameter, are light and are capable of withstanding much greater pressure than the shells of cylindrical boilers, which are very much larger in diameter. The amount of water contained in a water tube boiler is about one-twentieth of the weight of that required for a cylindrical boiler, and therefore the double advantage of rapid generation of steam combined with less weight of boiler and water is secured; so that it is small wonder the change from the cylindrical to the water tube type of boiler has taken place in war vessels, where lightness of machinery and boilers, rapidity and ease of steam generation, and power of increasing speed quickly when under way, are matters of the greatest value and importance. We shall never return to the cylindrical type of boiler in our navy, and as old vessels gradually become replaced by new, and as the older types of boilers wear out, the water tube boiler of some kind or other is sure to be adopted in their place.

There are, of course, some disadvantages to be set against the water tube boiler. These as a general rule are not altogether the fault of the boiler, but arise from difficulties which have occurred from the use of high pressure steam, by losses of steam and water through leaks in the valves or pipes of the steam system, whereby the coal consumption has become increased, or by other small defects of design or management of the main and auxiliary machinery, all of which causes have become accentuated by the higher steam pressures now in use. It might be mentioned that at the time it was decided to change to the water tube class of boiler, the highest steam pressures in cylindrical boilers of naval vessels were, as we have already stated, 155 lbs. per square inch, and with the adoption of the water tube boiler we went at once to 260 lbs. and 300 lbs. per square inch. This sudden increase in the steam pressures is considered by many able engineers to be the cause of a great part of the trouble which has arisen in some, but not all, of our larger vessels that are fitted with boilers using these high pressures; but it is a trouble that is remediable, and has, in many cases, been already surmounted.

Although the change in our boiler policy is a recent matter, the actual question of fitting water tube boilers to steam vessels is not new. It is only of late years, however, that it has attained such prominence. As early as the year 1857 attempts were made to place these boilers in some vessels of the mercantile marine, but they were not successful, and their failures were principally due to the rapid corrosion and wasting away of the tubes, and to the incrustations that took place on their interior surfaces owning to the leakage of salt water from defective condensers into the feed water for the boilers, or to the occasional enforced use of salt water to make up the losses which occurred in the regular supply of feed water for the boilers. In all cases the tubes of the boilers were either completely destroyed, or choked to such an extent that the boilers became dangerous. In France as long ago as the year 1880, Belleville boilers were placed in a small dispatch vessel, and did some good service; two years later the cruiser Milan was fitted with similar boilers. In 1889 the French cruiser Alger, of 8,000 I.H.P., was supplied with an installation of twenty-four of these boilers, and one or two small gun vessels were also provided with boilers of the Belleville type; the Messageries Maritimes Co. also had them placed in their steamers, which have since made long and continuous voyages between Marseilles and Australia with satisfactory results. It was owing to their successful operation in these vessels that they were adopted in the British navy, after a report had been made upon their suitability by a British naval engineer officer, who had been specially sent on a voyage to Australia and back in the Messageries steamers to obtain experience of the actual working of the Belleville boilers.

While there are now many kinds of water tube boilers employed in our navy, they may be grouped under two distinct classes, namely, those of the large, straight tube type, and those of the small tube type. Of these latter the tubes are in nearly all cases very small in diameter and are curved, with the exception of the Yarrow boiler. The small tube varieties of these boilers that find most general employment at present in the British navy are the Thornycroft, Yarrow, Normand, Reed, Mumford, Blechynden, White and Du Temple types. These are principally fitted in small craft, such as launches, torpedo boats, torpedo boat destroyers and in a few torpedo gun vessels and one or two sloops and third-class cruisers. In every case, as we have before stated, there is a considerable saving of weight by their adoption, and in the case of the fast torpedo boat destroyers and gun vessels their very high rates of speed would be absolutely unattainable without them. In the classes of vessels referred to above the boilers which had been previously used were of the marine locomotive type. This kind of boiler, which is eminently successful on land, utterly failed at sea under the conditions of forced draft pressures, which had to be used in order that they should generate steam with sufficient rapidity and pressure to drive the vessels in which they were fitted at their maximum speed.

The Thornycroft boiler was the first of the water tube type to be successfully used in the British navy. It was placed in a second-class torpedo boat in 1885, and since then this vessel has done constant service with satisfactory results. In 1892 a water tube boiler, designed by Messrs. Yarrow, was fitted in another torpedo boat and she has also given satisfaction. In 1891 the torpedo gun vessel Speedy, of 4,500 I.H.P., was fitted with Thornycroft boilers, which have been most successful; and since that date the types of water tube boilers have increased considerably, and are still increasing. As a general thing these small tube boilers are all designed upon the same principle, and differ only in details. It is difficult to describe them accurately without a drawing, but they may be likened roughly to an equilateral triangular figure, at each angle of which a cylindrical vessel is situated, the cylinders at each end of the base being smaller than the cylinder at the apex, and being joined to it by a series of tubes. The base of the triangular figure forms the grate, and the lower cylinders and the tubes, up to a certain portion of their height in some cases, and in other cases the whole of the tubes and a portion of the upper cylinder, contain water. The whole of the structure is enveloped, as far as the upper cylinder, with a light casing which serves to contain the heat from the grate or furnace, funnels being provided at the upper part of the casing. The heat, flames and smoke from the furnace pass around and between the rows of tubes which form the walls or sides of the triangle, and the steam which becomes generated inside the tubes is collected in the upper cylinder, or steam drum, whence it is conveyed by suitable valves and pipes to the engines. The Yarrow boiler has walls of straight tubes, but the tubes of the other small tube types of water tube boiler which have been previously mentioned are curved in various ways, the object of this being to afford a greater length of tube, and to secure thereby a greater amount of heating surface. It will be possible to construct Yarrow boilers with large tubes; and the Babcock & Wilcox type of boiler, which is of a different design altogether, and which has already been fitted in the Sheldrake, is rapidly gaining favor for use in larger vessels. The Niclausse is also a large tube type of water tube boiler, which has been fitted for some time in the Seagull, and is to be installed likewise in the new cruiser Suffolk. In the small tube type of water tube boiler the tubes are difficult to examine and clean, but, as a rule, the small vessels in which they are fitted can easily be replaced, and are not of such importance as large vessels, such as cruisers or battleships, which are often required to keep the sea for considerable periods upon their own resources. In these ships it is necessary that the tubes may be easily examined, cleaned and replaced, and for this reason boilers with large straight tubes are preferable.

The present discredited Belleville boilers are the only large tube type that has been extensively adopted in the British navy, and it is only fair to say that although about sixty large cruisers and battleships have been fitted with them, the vessels in which they have failed have been very few. Twenty Belleville boiler vessels have been in commission already and many of them are doing good service. With the exception of the experimental gun vessel Sharpshooter the Powerful and Terrible were the first vessels of the navy to be so fitted, and this on the most extensive scale. The Terrible is still on service in China, the Powerful has already completed a commission in China and South Africa, and on her return to England her boilers were reported to be in very good condition. Most of the other vessels having these boilers are giving better results as their engine room staffs become accustomed to them, and doubtless they will continue to improve. In the meantime there does not seem to be reason for panic. We had similar difficulties years ago when we changed from low to high pressures and cylindrical boilers carrying 60 lbs. of steam per square inch came into use. The boilers of many vessels at the period of such change were found to have corroded so much that new boilers were required at the end of one commission. The remedy for this was found, and doubtless the present difficulties, which are already half overcome, will submit to the engineering skill and treatment which increased experience with this class of boiler will surely indicate.

MORGAN SAID TO HAVE SECURED NOVA SCOTIA WORKS.

A dispatch from Halifax says: "There is no longer any doubt that the Morgan syndicate has secured possession of the Nova Scotia Steel Co.'s plant and franchises at New Glasgow and North Sydney. The official announcement will be made early next week. It is declared positively by those who know that Morgan's plans include the most strenuous competition with the Dominion Iron & Steel Co. at Sydney by the establishment of immense mills at North Sydney. By the aid of the Dominion bounty and his illimitable capital, Mr. Morgan and his associates expect to make it exceedingly interesting for the Canadian company. Among other plans which Morgan contemplates is the making of North Sydney an ocean port. This will be done by utilizing the new railway which Mackenzie & Mann are constructing in Nova Scotia, which will give close railroad connection with New York and Boston, and it is believed that swift ocean steamers can land passengers and mails at North Sydney in a little over four days from England and in five days from New York."

Mr. Edward Gaskin, formerly general manager of the Union Dry Dock Co., Buffalo, has opened an office in Ellicott Square, Buffalo, and will engage in the preparation of plans and specifications for ships, surveys and estimates, superintendence, etc. Mr. Gaskin certainly knows the business and will undoubtedly find a demand for the knowledge gained in a great many years of full management of a lake yard.

PROPOSED OTTAWA SHIP NAVIGATION.

THE MONTREAL, OTTAWA & GEORGIAN BAY CANAL CO. GIVES ITS VIEWS UPON THE SUBJECT.

The Montreal, Ottawa & Georgian Bay Canal Co., Ottawa, Canada, has issued a monograph on "The Growth of the Traffic of the Great Lakes and the Proposed Ottawa Ship Navigation." This company has for its object the building of a deep waterway between the great lakes and Montreal, via Georgian bay and the Ottawa river. Its memorandum is a beautiful publication upon the subject. A condensation of the argument of the monograph is as follows:

The route of the proposed deep waterway is from Georgian bay up the French river into Lake Nipissing. Thence across a divide through some smaller lakes into the Mattawa river, and then down the Mattawa and the Ottawa rivers to Montreal. Its length will be 430 miles. It will rise from Lake Huron to Lake Nipissing 60 ft. and then fall to the St. Lawrence at Montreal 621 ft. There will be fifty single locks, 500 ft. long, 60 ft. wide, with sills 20 ft. deep, so placed that they can be duplicated easily as soon as the traffic warrants. The distance from Chicago to Montreal by this route will be 905 miles, the distance from Chicago to Buffalo being 900 miles. Navigation being of necessity slower in the waterway than in the open lakes, a vessel would need just one full day more time, 24 hours, to reach Montreal than Buffalo, or two days more on the round trip. It costs about 1¼ cents a bushel to transport grain from Chicago to Buffalo. It will cost 1½ cents to take it to Montreal.

At Buffalo it is necessary to break bulk and transship by canal or rail for New York, with elevator charges in addition. At New York there are lighterage and elevator charges for getting the grain aboard ocean-going vessels for export. At Montreal there will be one transshipment, from the lake carrier to the ocean carrier. It costs 3¼ cents per bushel to deliver the grain from Buffalo to the seaboard, making the total cost from Chicago to New York 4½ cents. The grain of the northwest can be taken to Montreal, the seaboard, by the proposed route for 3 cents per bushel less than the present cost of delivery to the seaports of the United States. It is said in Chicago that from ⅛ to ¼ of a cent saving is sufficient to determine the route of shipment, which would enable the Canadian company to charge at least 2¾ cents per bushel in tolls. The company figures, however, on charging 1½ cents per bushel, or 50 cents per ton, for grain, and figures that at that rate the returns on the capital invested in building the canal would average 4 per cent. on the first ten years' business. The canal is expected to cost $68,000,000. It is found by the surveys that out of the 430 miles of waterway to be controlled by the company, 367 miles of it is already natural deep water navigation of 22 ft. and over. There are two sections of heavy work, one the summit level, where a cut of 25 miles in rock must be made, and the other in the Ottawa river channel for a distance of 30 miles. It is noted that a waterway of this type will furnish an opportunity for the ocean tramp steamer to penetrate to the great lakes, for the majority of them are built of a length of 450 ft. and to draw 24 ft. of water as a maximum. By lightering their load at Montreal to 19 ft. draught they can navigate the proposed waterway.

Careful computations from reports of boards of trade, commercial statistics, Sault canal reports and other compilations show that the canal could reasonably expect an average annual shipment of export grain from the northwest amounting to 5,000,000 tons. Of copper ore fully 100,000 tons would be carried. There is a strong foreign demand for Lake Superior iron ore to take the place of Spanish iron ore, which is being rapidly exhausted for making Bessemer steel. The Spanish output is 6,000,000 tons. The export of beef and hog products of the United States for 1899 from Chicago and the northwest amounted to 1,574,000 tons. The Ottawa lumber district sends out 2,000,000 tons of sawn lumber annually, while the cordwood output is not far from 5,000,000 tons. Pulpwood is a considerable product, there being, it is said, 2,000,000 cords of standing spruce in the Lake Nipissing region suitable for pulpwood, and it is believed that the shipments of pulp alone would soon amount to 1,000,000 tons per annum. For a return cargo, Nova Scotia coal might be carried. Upon the basis of these estimates, it is figured as reasonably certain that the business of the canal when once opened to commerce ought not to fall short of 7,000,000 tons. The United States deep waterway commission figured that the American waterway ought to do a business of 20,000,000 tons, and should be capable of handling 38,000,000 tons. George Y. Wisner recently in a letter to Ernest E. Sawyer of Ottawa, Canada, which is printed in this memorandum, says that the average annual traffic of the proposed Canadian deep waterway in his opinion for the first ten years of its existence ought not to fall short of 8,000,000 tons.

It is proposed to charge tolls only one way. The estimate for business is for one way. There will be an equal tonnage returning, but most of it light, especially at first. It is expected to charge 50 cents per ton one way, the vessel to return free, or else 25 cents each way. Ocean-going vessels loaded both ways, however, would be charged a toll of 50 cents each way. The estimate of revenue on 7,000,000 tons is therefore, $3,500,000. It is proposed to issue bonds to the amount of $65,000,000 at 3 per cent., making the interest charge $1,950,000. This leaves a big margin for cost of maintenance and profits.

It would take five years to construct the proposed waterway, which is five years less than the time the United States commission estimated for the American waterway. The memorandum points out this fact, and adds if the Canadian waterway is built the American waterway will never be able to compete. That portion connecting the St. Lawrence with the Hudson making a short route from Montreal to New York through Lake Champlain, might be constructed, however. The Canadian waterway with this extension, would be 300 miles shorter than any practicable route wholly within the United States, between Chicago and New York—1,350 miles, against 1,625, to be exact. With this New York extension the Canadian canal could reasonably expect to secure the volume of domestic traffic estimated by the United States commission for the American canal, or 20,000,000 tons per annum. The Canadian canal from its geographical location, would be open for business on an average of about seven months of the year.

THE PORT OF ANTWERP

Many of the leading forwarders and ship brokers of European ports are giving attention to reports from all parts of the United States that indicate development in our foreign shipping and are making arrangements to place themselves in correspondence with concerns on this side that must form business relations with foreign agencies. These European houses are especially interested in the vessels that are to undertake a direct trade from the great lakes. The following information regarding the port of Antwerp has been furnished to the Marine Review by Messrs. Kennedy, Hunter & Co., a firm established since 1806 as ship brokers, agents, loading brokers and forwarding agents, and representing large shipping interest at that port:

"Antwerp, the chief port of Belgium, is situated on the right bank of the river Scheldt, about 60 miles from Flushing at the mouth of the river. From the fact that steamers such as the Southwark of 8,607 tons register, 480 ft. long, 57 ft. beam and 37 ft. deep, and the Zeeland of 11,000 tons register, 560 ft. long, 60 ft. beam and 38 ft. deep, are regular traders here, we think we need hardly say that Antwerp may be considered as the most suitable port on the continent for the accommodation of steamers of large capacity. The port charges having been considerably reduced during the last five years, and especially so for steamers engaged in a regular trade, and cargo being handled with unusual dispatch and at an expense which, owing to keen competition, has now reached the bottom level of cheapness both for loading and discharging, it may be said that Antwerp is also one of the cheapest and most suitable ports in Europe for large steamers. Steamers, whose draught prevent them entering the docks, are berthed alongside the river quays which extend for a distance of over 3,500 meters, provided with covered sheds 150 ft. wide, where the loading and discharging can be carried on night and day, Sundays and holidays included, without interruption.

"Owing to its geographical position and the great facility afforded by its communications by rail and water at very moderate tariffs, Antwerp commands the greater portion of the traffic moving to and from the continent to all parts of the world and may therefore be considered as the most convenient initial loading and final discharging port for any line of steamers trading between the United States and Europe. This is abundantly proved by the fact that no less than sixty shipping companies have their steamers now engaged in regular lines from Antwerp to European, North and South American, African, Indian, Australian and far eastern ports under either the Belgian, French, German or British flag. Notwithstanding this, there is still a field open for new comers and as the traffic continues to increase in excess of the tonnage available, we venture to think that the American firms who we observe lately are going in largely for shipping, would find it to their advantage to give Antwerp serious consideration, and are convinced that if they give the port a fair trial they would soon find out that its resources and advantages will compare favorably with the results to be obtained at any other port on the continent."

Messrs. Kennedy, Hunter & Co. add that they would be pleased to give further information or advice to any American firm who may contemplate the opportunity of availing of the resources of Antwerp and who may find it convenient to avail of their long experience in shipping matters with the view of extending commercial transactions and promoting regular shipping communication between the United States and Antwerp.

HOW J. PIERPONT MORGAN IS REGARDED ABROAD.

Says the Engineer of London about Mr. Morgan and the Leyland line, and several other things:

"Not long ago we told our readers that Europe had to compete not with the American traders, but with a very few individuals. Events have confirmed and enforced the accuracy of that statement. The formation of the steel trust is matter of history, and now it is announced that Mr. Pierpont Morgan has bought all the ordinary shares in the Leyland Co., paying £14 10s. per share for the £10 shares. A further purchase of preference shares gives the Morgan syndicate a dominant interest, and the Leyland line, with sixty-five ships of 321,000 gross tons, representing a capital of £3,300,000, virtually passes into American hands. The merits of the case have been fully discussed in the pages of our daily contemporaries, and we need say little on the subject at this moment. The prominent fact, no doubt, is the policy of Mr. Morgan. Last week we referred to the Sydney Iron Works, Nova Scotia, at some length. The latest information available is that the Morgan syndicate has bought these works in order to forestall the British capitalists and to escape the British tariff on foreign iron, which is suggested as a possibility of the near future. The works are to be extended. It is said that the purchase of the Leyland line is part of Mr. Morgan's plan for conveying the output to England. The position is one without any historic parallel. Nothing like it has been contemplated by any writer on the science of political economy. There is no apparent reason why Mr. Morgan should not make further acquisitions; indeed, if rumor is to be believed, he intends to obtain control of more than one branch of trade on the continent. The strength of the trust movement is also its future danger. It is a one-man movement. No doubt Mr. Morgan is backed up and helped by men scarcely less able than he is, yet it is obvious enough that, Atlas-like, he carries a world on his own shoulders, and his collapse would mean ruin to thousands of shareholders. The purchase of the Leyland line has so far been regarded with equanimity in shipping circles. The affairs of the company have been reasonably prosperous, but there has not been a very large margin, and 7 per cent. or so in good times is none too reassuring; probably the shareholders will in the long run find that they have had the best of the transaction. Mr. Morgan appears to be disposed to play the part of Napoleon, and conquer the world. Whether the career of the great financier has a more solid basis for permanent success than that of the emperor remains to be seen. For the present Mr. Pierpont Morgan is a power in the commercial and manufacturing world whose actions deserve to be watched with interest."

Pan-American exposition rates to Buffalo are in effect April 30 via the Nickel Plate road at one-and-one-third fare for the round trip, good to return within fifteen days. A rate of one fare for the round trip will be made good going on Tuesdays in May and returning within five days. Write, wire, 'phone or call on nearest agent, or E. A. Akers, C. P. & T. A., Cleveland, O.
47, May 30.

THE SYSTEM OF TELPHERAGE.

The United Telpherage Co., Nos. 20-22 Broad street, New York, is adapting its remarkable telpher system to marine uses. Before going any further it may be necessary to explain what telpherage is, because its commercial life has not been long.

Telpherage is the automatic transportation of material by electricity, either overhead, designated as aerial telpherage; upon the surface, called surface telpherage; and underground, or tubular dispatch telpherage. Its adaptability is infinite. Individual plants themselves are frequently of great size and it is necessary that there should be some means of automatically transporting material from one portion of the works to the other. This is done expeditiously and more economically by telpherage than by any other known method. It should be considered that electricity does the work and that the expense for maintenance and operation is nominal. The company is preparing a circular showing its adaptability to the handling of miscellaneous freight at railway stations, steamboat docks and piers. Telpherage, too, has solved the problem of loading and unloading vessels of too great draught to reach loading berth.

Following are some of the purposes for which this means of transportation can be adopted: For the transportation of goods from one portion of works to another, or from one warehouse to another over intervening yards and buildings; coal from railway cars to boiler houses; fuel and ore to the smelting furnaces; ores from mines to dressing floors; coals and ores from mine to railway, river or coast; materials across rivers, ravines, valleys or cultivated lands; felled logs from jungles, swamps or mountainous countries; and indeed a great variety of things in which economy and rapidity of movement are essential.

As much of the original work in telpherage was devoted to overhead cableways, the meaning came gradually to be restricted to electric aerial transportation, but is now generally restored to its original meaning and applies not only to cableways, but to electric automatic transportation, whether overhead, surface or underground. Telpherage has, however, its own peculiar field, and this was clearly expressed by Prof. John Perry, the professor of mechanical engineering and applied mathematics of the city of guilds of London Technical College, who, with Prof. W. E. Ayrton, the professor of technical physics, has devoted much time in the past to the scientific and commercial development of telpherage. In a lecture delivered by Prof. Perry he shows the great possibilities of telpherage, and states that "the commercial success of telpherage depends upon the conveying of light loads and the subdivision of material." Telpherage is not therefore, a competitor of existing railways for passengers or for bulky or heavy freight. Another authority says: "The crowds handled by the street railway companies on holiday occasions, which far exceed the capacity of a double-track railway as ordinarily operated, seems remarkable. But the condition of an electric road is that of a large number of small units following each other in quick succession and at a uniform speed." It is upon this principle that telpherage lines are operated, and the results are most remarkable.

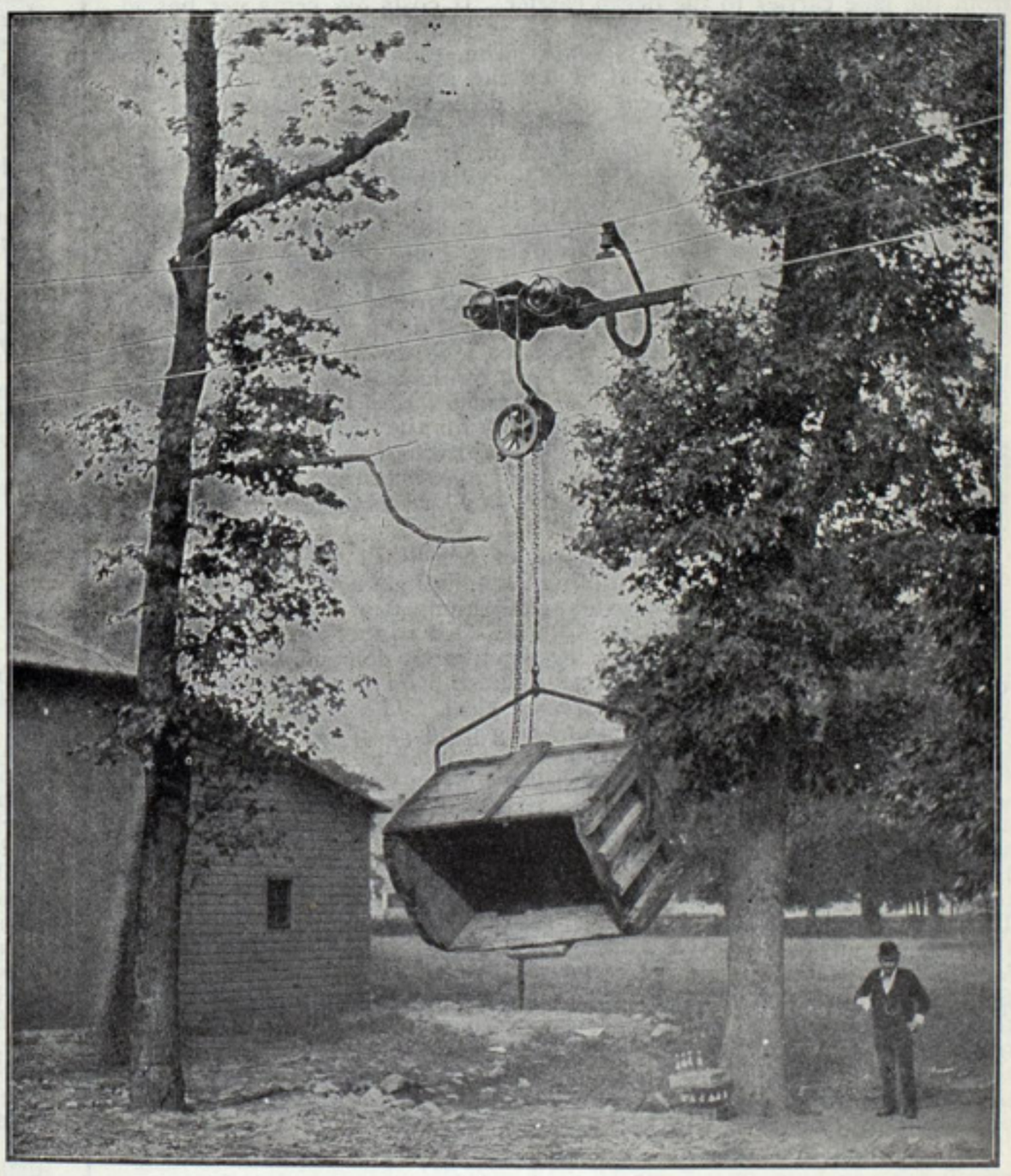
It is impossible to have a general method applicable to all cases of telpherage. The conditions pertaining to the erection of two important telpher plants are never alike. The problem before engineers is always one of adaptability; perplexing difficulties must be encountered and successfully overcome in every new proposition. The installation of each new telpher plant must be considered as a special piece of engineering work, which must be thought out by itself, and is subject to no general rules. There is always to be regarded not only the strains and expense, but the peculiar material to be transported. The length of the spans, the terminal facilities, the best methods of loading and unloading must receive the most careful study and attention. There are, however, certain fixed limiting factors which cannot be neglected, and which are either obstacles or helps. Each cable, hanger, bracket and terminal must be figured out with mathematical certainty, verified and proved before the work is commenced.

The company is always glad to suggest plans, sketches and applications of its system best adapted to each individual case.

MASTERS AND ENGINEERS OF LAKE VESSELS.

Richelieu & Ontario Navigation Co., Montreal, Can.: Steamers—Kingston, Capt. H. Esford, Engineer A. R. Milne; Toronto, Capt. H. P. Grange, Engineer Wm. Black; Algerian, Capt. D. Mills, Engineer W. Parker; Hamilton, Capt. A. J. Baker, Engineer R. Marshall; Spartan, Capt. J. McGrath, Engineer N. Beaudoin; Columbian, Capt. C. Hinckley, Engineer ———; Bohemian, Capt. A. Dunlop, Engineer G. Gendron; Corsican, Capt. ———, Engineer G. Booth; Quebec, Capt. J. Boucher, Engineer F. Gendron; Montreal, Capt. L. St. Louis, Engineer F. X. Hamlin; Carolina, Capt. G. Riverin, Engineer M. Latulippe; Canada, Capt. Charles Lapierre, Engineer Ed. Dennis; Sagunay, Capt. A. Fortin, Engineer E. Hamlin; Three Rivers, Capt. F. St. Louis, Engineer J. Matt; Berthier, Capt. C. Gouin, Engineer E. Arcand; Chambly, Capt. G. Paulin, Engineer C. Gendron; Terrebonne, Capt. Lavolette, Engineer N. Beaudoin; Sorel, Capt. Fauburt, Engineer ———; Firefly, Capt. F. Crepeau, Engineer Thos. Matt; Laprairie, Capt. P. McLean, Engineer ———; Lonqueuil, Capt. F. Jodoin, Engineer Noel; Hochelega, Capt. H. Mondeville, Engineer B. Plantal; Hosanna, Capt. D. Mongeau, Engineer E. Gendron; Cultivateur, Capt. J. Gouin, Engineer F. Chapdelaine.

Corrigan, James, Managing Owner, Cleveland: Steamers— J. Emory Owen, Capt. J. W. Brion, Engineer P. J. Navaugh; Bulgaria, Capt. N. L. Miner, Engineer J. H. Smith; Caledonia, Capt. Robt. Donaldson, Engineer Geo. Town; Italia, Capt. Jno. McArthur, Engineer W. B. Roche; Quito, Capt. Geo. E. Talbot, Engineer H. Gordon; Robert Wallace, Capt. F. D. Perew, Engineer Frank Stevenson; Iron Age, Capt. David Hutcheson, Engineer F. Craig; Iron Duke, Capt. W. A. Ashley, Engineer S. Moore; Iron Chief, Capt. Geo. A. Symes, Engineer H. Haynes; Progress, Capt. Ed. Rains, Engineer J. Radford; M. M. Drake, Capt. J. W. Nicholson, Engineer Ed. O'Neil; Minnesota, Capt. F. B. Cody, Engineer C. Stedman. Schooners—Amazon, Capt. Robert DeLong; Australia, Capt. Harvey Peters; Polynesia, Capt. A. D. McKay; Tasmania,



Sample of United Telpherage Co.'s System.

Capt. Martin Howard; Iron Cliff, Capt. Martin Kurth; Michigan, Capt. Jno. McArthur, Jr.; Ashland, Capt. U. S. Cody; J. T. Hutcheson, Capt. Arthur Adams; J. I. Case, Capt. S. W. Gould; Marion W. Page, Capt. Frank Moore.

Anchor Line, E. T. Evans, Mgr., Buffalo: Steamers—India, Capt. P. O'Neil, Engineer John Forrester; China, Capt. Chas. Christy, Engineer Jno. Wise; Japan, Capt. John Doherty, Engineer Wm. Wilson; Alaska, Capt. Edward Martin, Engineer Dan Donohue; Wissahickon, Capt. H. Cronkhite, Engineer John Schniderwin; Delaware, Capt. J. H. McAvoy, Engineer Albert Edgar; Juniata, Capt. Geo. J. Delaney, Engineer E. Davies; Conestoga, Capt. Frank Williams, Engineer E. A. Welch; Lycoming, Capt. L. Wright, Engineer Fred Rehbaum, Jr.; Conemaugh, Capt. F. Bloom, Engineer A. Jones; Lehigh, Capt. J. H. Berow, Engineer Tim Griffin; Clarion, Capt. Chas. Nelson, Engineer Fred Rehbaum, Sr.; Susquehanna, Capt. Dall Ryder, Engineer Geo. McLeod; Codorus, Capt. A. McKenzie, Engineer Wm. Swain; Schuylkill, Capt. H. O. Miller, Engineer John Jordan; Mahoning, Capt. Jos. Corcoran, Engineer Al. Black.

Tonawanda Iron & Steel Co., N. Tonawanda, N. Y.: Steamers—Fleetwood, Capt. Edward Sullivan, Engineer T. J. McDonnell; John F.

Eddy, Capt. O. J. Solean, Engineer Frank Trinkwalder; Geo. Spencer Capt. A. C. Hansen, Engineer Fred Gilbert; C. F. Curtis, Capt. Jas. Cunningham, Engineer W. J. Cunningham; Veronica, Capt. David Carrier, Engineer E. D. Burdue; Clyde, Capt. J. S. Neal, Engineer T. F. Patrick; Oceanica, Capt. C. S. Furey, Engineer Mr. Ahern. Schooners—B. L. Pennington, Capt. Peter Keischgens; Whaleback 101, Capt. J. J. Carr; Amboy, Capt. F. B. McGreevy; T. S. Fassett, Capt. John Barclay; N. C. Holland, Capt. J. H. Christie.

Algoma Central Steamship Line, Sault Ste. Marie, Ont. (This is Clergue vessel interest. A. Miscampbell is superintendent and J. B. Foote port captain): Steamers—Minnie M., Capt. A. A. Batten, Engineer J. Grimes; Ossifrage, Capt. J. Hursley, Engineer J. L. Smith; Philadelphia, Capt. B. Burk, Engineer T. Horgan; Bertha Endress, Capt. T. Hill, Engineer H. McMillan; Theano, Capt. A. W. Stonehouse, Engineer H. McLaughlin; Paliki, Capt. T. C. Macoubrey, Engineer Mr. Fraser; Leafield, Capt. J. Davidson, Engineer J. Fraser; Monkshaven, Capt. A. Gilchrist. Schooners—Barr, Capt. Smith; Barlum, Capt. J. Rosie.

Bradley, M. A., Cleveland: Steamers—Alva, Capt. M. Mulholland; George Stone, Capt. C. H. Francke; Hesper, Capt. J. A. Holmes; Pasadena, Capt. J. H. Wysoon; Gladstone, Capt. Paul Howell; M. B. Grover, Capt. E. Mooney; City of Cleveland, Capt. M. S. Thompson; R. P. Ranney, Capt. C. R. Baker; J. S. Fay, Capt. L. Stough; F. Kelley, Capt. A. E. Bullock; S. E. Sheldon, Capt. W. J. Pringle. Schooners—Adriatic, Capt. E. Saveland; A. Cobb, Capt. N. Gifford; D. P. Rhodes, Capt. John Rabshaw; Sandusky, Capt. W. A. Serles; Thos. Quayle, Capt. Fred Green; Negaunee, Capt. O. C. Olson.

Goodrich Transportation Co., Chicago: Steamers—Columbus, Capt. Robt. Smith, Engineer Geo. McLaughlin; Virginia, Capt. H. E. Stines, Engineer G. P. Roth; Indiana, Capt. A. Gallagher, Engineer Raymond Flint; City of Racine, Capt. J. A. Wilson, Engineer Jos. Weber; Iowa, Capt. Jno. Raleigh, Engineer J. Buschman; Atlanta, Capt. Ed. Carus, Engineer A. J. Smith; Georgia, Capt. C. T. Bronson, Engineer W. T. Jerome; Sheboygan, Capt. Ben Sniffin, Engineer Felix Neidler; Chicago, Capt. ———, Engineer Thos. Dorey.

Mitchell & Co., Cleveland: Steamers—H. S. Holden, Capt. F. D. Galton; J. J. Albright, Capt. M. P. Parsons; Lagonda, Capt. H. H. Donaldson; M. A. Hanna, Capt. R. C. Jackson; H. C. Frick, Capt. S. Stratton; W. E. Reis, Capt. B. D. Townsend; Walter Scranton, Capt. Chas. B. Galton; R. L. Fryer, Capt. Fred Furton; John Mitchell, Capt. Alex. Beggs; John J. McWilliam, Capt. John D. Baird; Geo. T. Hope, Capt. Millard Stewart. Schooner—Troy, Capt. H. C. Dien.

Drake & Maytham, Buffalo: Steamers—Vega, Capt. J. N. Smith, Engineer Albert McMinn; Vulcan, Capt. R. J. Neville, Engineer G. F. Froggatt; America, Capt. G. H. Vroman, Engineer Thos. Herringer; Brazil, Capt. Robt. Gibson, Engineer Jno. Conners; Wm. H. Gratwick, Capt. Jos. Hulligan, Engineer Adelbert Barker; Chili, Capt. Jas. Gibson, Engineer Wm. Lewis. Schooners—Antrim, Capt. Geo. McMinn; Tyrone, Capt. A. Kelley.

Runnels & Sinclair, H. E. Runnels, Mgr., Port Huron, Mich.: Steamers—Maggie Duncan, Capt. D. M. Sinclair, Engineer ———; O. O. Carpenter, Capt. J. E. Rathbun, Engineer J. E. Watson. Schooners—Favorite, Capt. L. Sinclair; Constitution, Capt. E. R. Tousley; E. E. Tyson, Capt. C. W. Annis; Dashing Wave, Capt. ———.

Chamberlain, C. A., Detroit: Steamers—Champion, Capt. H. W. Baker, Engineer ———; Huron City, Capt. Fred Manuel, Engineer ———. Schooners—Wm. Jones, Capt. A. M. Elliott; Wm. H. Rounds, Capt. H. B. Leonard; Belle Hanscome, Capt. Fred Sharpsteen; Bay City, Capt. Jas. Glenn; Lillie May, Capt. ———.

Mills, N. & B., Marysville, Mich.: Steamers—Havana, Capt. Thos. Deringer, Engineer ———; Sparta, Capt. Alex. Johnston, Engineer ———; N. Mills, Capt. Dan Warwick, Engineer Geo. Ingham; J. E. Mills, Capt. J. A. Ellery, Engineer Geo. Robertson; City of Concord, Capt. J. R. Inches, Engineer Geo. Cater.

Wilson Transit Co., Cleveland: Steamers—Henry W. Oliver, Capt. W. W. Dawley; Thomas Wilson, Capt. Jos. Wood; W. D. Rees, Capt. C. A. Benham; Andrew Carnegie, Capt. C. C. Lonsley; Yuma, Capt. Dan Buie; Spokane, Capt. W. D. Williams. Schooner—D. Z. Norton, Capt. J. D. McPherson.

Northwestern Steamship Co., W. F. Purdy, Mgr., Chicago: Steamers—Northwestern, Capt. G. E. Atkinson, Engineer Jas. P. Gibson; Northman, Capt. C. E. Ross, Engineer John M. Duggan; Northeastern, Capt. Jno. Crangle, Engineer Angus Marshall; Northtown, Capt. H. Pedersen, Engineer ———.

Neff & Sons, Samuel, Milwaukee, Wis.: Steamers—Adella Shores, Capt. J. A. Doak, Engineer P. Keenan; Minnie E. Kelton, Capt. A. E. Anderson, Engineer E. Hidden; Marion, Capt. H. M. Boyce, Engineer S. R. Newnham. Schooner—O. J. Hale, Capt. H. J. Nelson.

Minch & Nicholas Transportation Companies, Wm. Gerlach, Mgr., Cleveland: Steamers—I. W. Nicholas, Capt. N. B. Nelson; Onoko, Capt. Jos. Lampoh; Philip Minch, Capt. W. H. Johnson; Wm. Chisholm, Capt. Wm. Carloss; John N. Glidden, Capt. Henry Hinslea.

Vance & Co., David, managing vessels of West Division Steamship Co., Milwaukee: Steamers—Fred Pabst, Capt. D. C. Sullivan, Engineer ———; W. H. Wolf, Capt. Em. Lund, Engineer ———. Schooner—Armenia, Capt. Geo. M. Dennis.

Pauly, H. J., Milwaukee: Steamers—Thos. Davidson, Capt. Alexander Cleghorn, Engineer John McMillan; Walter Vail, Capt. R. C. Smith, Engineer Thos. Martin. Schooners—Baltic, Capt. Thos. O'Donnell; Aberdeen, Capt. Jonas Hansen.

White Line Trans. Co., W. H. Singer, Gen. Mgr., Duluth: Steamers—Bon Voyage, Capt. J. P. Foley, Engineer Jas. Evans; Bon Ami, Capt. Ben Lewis, Engineer Jas. Bishop; Mabel Bradshaw, Capt. A. Clausen, Engineer Lewis W. Griggs.

Northern Transit Co., M. A. Bradley, Mgr., Cleveland: Vessels of this company are the steamers Badger State and Empire State. They were not fitted out on the opening of navigation, and names of officers cannot, therefore, be given.

White Star Line, B. W. Parker, Gen. Mgr., Detroit: Steamers—Tashmoo, Capt. B. S. Baker, Engineer Winfield Dubois; City of Toledo, Capt. A. Fitts, Engineer John Westrick; Greyhound, Capt. Jno. J. Stover, Engineer A. Beddaulph.

Runnels, H. E., Port Huron, Mich.: (Manager for Estate of Thos. Currie). Steamer—City of New York, Capt. Guy G. Geel, Engineer ———. Schooners—Wm. Grandy, Capt. A. J. Ellory; Geo. H. Wand, Capt. F. Dana.

Rend & Co., W. P., 115 Dearborn St., Chicago: Steamers—G. G. Hadley, Capt. Michael Fitzgerald, Engineer ———; Panther, Capt. John Madden, Engineer ———. Schooner—Massasoit, Capt. Duncan Buchanan.

Red Star Line, 202 Main St., Buffalo: Steamers—Robert Mills, Capt. F. A. West, Engineer Wm. Skelton, Jr.; Wyoming, Capt. J. C. McLean, Engineer G. M. Bohnert; Cuba, Capt. Robert Young, Engineer Ernest Fury.

Vance & Co., David, managing vessels of Milwaukee Steamship Co., Milwaukee: Steamers—F. L. Vance, Capt. E. B. Marquette, Engineer ———; R. P. Flower, Capt. F. W. Van Patten, Engineer ———.

Teagan Bros., Detroit: Steamers—Hurlbut, Capt. Jos. Parsons, Engineer Wm. Westbrooke; H. S. Pickands, Capt. J. B. Maddock, Engineer Matt Lacey. Schooner—D. K. Clint, Capt. Bert Peltier.

McGraw Trans. Co., Bay City, Mich.: Steamers—City of Paris, Capt. E. D. Ballentine, Engineer Wm. C. McDougall; City of Venice, Capt. Philip Broderick, Engineer J. A. McDougall.

Vance & Co., David, managing vessels of Inter Ocean Trans. Co., Milwaukee: Steamers—Maryland, Capt. J. E. Yax, Engineer ———; Manchester, Capt. Tim Kelley, Engineer ———.

Iroquois Iron Co., East Side P. O. Station, Chicago: Steamers—Fred Mercur, Capt. Alvin C. Neal, Engineer Wm. Teahan; H. E. Packer, Capt. H. F. Loftus, Engineer Wm. Patterson.

Osborne, F. M., Perry-Payne Bldg., Cleveland: Steamers—John W. Moore, Capt. Emil Detleffe, Engineer A. G. Bohland; Louisiana, Capt. Truman Moore, Engineer Anthony Ward.

Madden, T. F., Bay City, Mich.: Steamer—Lizzie Madden, Capt. D. Elliott, Engineer Geo. H. Charlton. Schooners—Noquebay, Capt. P. H. Ryan; Mantenee, Capt. M. Ryan.

White, Guy, Managing Owner, N. Tonawanda, N. Y.: Steamer—Edward Smith, Capt. Chas. D. Miller, Engineer S. E. Coon. Schooner—Iron City, Capt. Michael Nagle.

John E. Mills, Managing Owner, Port Huron, Mich.: Steamers—Argonaut, Capt. Geo. Bennett; H. J. Kendall, Capt. H. J. Kendall; Thos. R. Scott, Capt. Paul Rivard.

Canadian Pacific Railway Co., Owen Sound, Ont.: Steamers—Manitoba, Capt. E. B. Anderson; Alberta, Capt. James McAllister; Athabasca, Capt. Geo. McDougall.

Graham Nav. Co., John P. Nagle, Mgr., Toledo, O.: Steamer—Aztec, Capt. E. F. Mattison, Engineer Jas. Leitch. Schooner—Miztec, Capt. Harry Larson.

Michigan Wrecking & Salvage Co., Detroit: Steamer—Ogemaw, Capt. Martin O'Toole, Engineer ———. Schooner—M. I. Wilcox, Capt. Chas. Woods.

Mitchell Transportation Co., Bay City, Mich.: Steamer—A. Folsom, Capt. Jno. Randall, Engineer Wm. Hay. Schooner—Mitchell, Capt. Wm. Mitchell.

Ryan, Thos. M., 23 W. Swan St., Buffalo: Steamers—Meriden, Capt. E. T. Clark, Engineer C. Johnson; Emerald, Capt. Jno. Morgan, Engineer ———.

Vance & Co., David, managing vessels of Wisconsin Steamship Co., Milwaukee: Steamer—F. Schlesinger, Capt. D. P. Craine, Engineer ———.

Drake, Bartow & Co., Cleveland: Steamer—Alcona, Capt. W. T. Sutherland, Engineer A. J. Millet. Schooner—Alta, Capt. J. McNamara.

Smith, L. P. & J. A., Cleveland: Schooners—Baldwin, Capt. Thos. Shurkey; Mikado, Capt. Geo. Vernia; Superior, Capt. J. Robinson.

Duncan, Jno. A., Managing Owner, Green Bay, Wis.: Steamer—John Duncan, Capt. Elmer Craine, Engineer Edward Rasmusen.

England, R. W., Mgr., 961 Third Ave., Detroit: Steamer—V. H. Ketchum, Capt. R. W. England, Engineer ———.

Eliza H. Strong, Tonawanda, N. Y.: Steamer—Eliza H. Strong, Capt. Wm. H. Strong, Engineer Albert E. Rhodes.

Robertson, Geo., Grand Haven, Mich.: Steamer—Sidney O. Neff, Capt. Geo. Robertson, Engineer Henry Greilick.

Peterson, Peter, Green Bay, Wis.: Steamer—T. S. Christie, Capt. Peter Peterson, Engineer D. L. McLennan.

Ranson, David J., Sault Ste. Marie, Mich.: Steamer—F. E. Spinner, Capt. W. E. Franklin, Engineer ———.

Chamberlain & Co., S. R., Sherman street, Chicago: Steamer—Joseph L. Hurd, Capt. Henry Wanvig.

Spence Bros., Cleveland: Steamer—H. E. Runnells, Capt. Geo. McLeod, Engineer Thos. McLaughlin.

Gilchrist, John, Perry-Payne Bldg., Cleveland: Schooner—Angus Smith, Capt. Wm. Summerville.

Wheeler, Chesley, Bay City, Mich.: Steamer—Elfinmere, Capt. Nelson Gonyaw, Engineer ———.

Corrigan, John, Cleveland: Steamer—Aurania, Capt. B. H. Jones, Engineer Wm. Bannerman.

Pan-American Exposition Dedication—The Nickel Plate road will sell excursion tickets to Buffalo, account the dedication of the Pan-American Exposition on May 20, at one fare for the round trip, good on trains arriving at Buffalo 4:45 p. m. May 19, and 2:05 a. m., 7:35 a. m., and 4.45 p. m. on May 20, and good returning for five days. Write, wire, 'phone or call on E. A. Akers, C. P. & T. A., Cleveland, O. 72, May 16

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—$3.00 per year in advance; foreign, including postage, $4.50, or 19 shillings. Single copies 10 cents each. Convenient binders sent, post paid, $1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

As a rule, J. Pierpont Morgan is credited with having paid considerably more for the Leyland line than it is worth. Conservative England was inclined to be hysterical over the purchase for a day or two until some of the sober journals called their attention to the fact that £14 10s. was a very fat figure to pay for £10 shares and that it was wisdom on the part of the shareholders to sell. No one should decline to make a profit of nearly 50 per cent. upon his investment if he can. Others who showed signs of great mental excitement were informed that the Leyland line did not embrace the whole of the shipping interests of Great Britain by a good deal. Engineering says:

"We do not think that the patriotic Briton need greatly fear that the negotiations are going to undermine the shipping supremacy of his country. To buy £10 shares at a premium of nearly 50 per cent. does not appear a very promising way of opening a new business, especially when one remembers that the shares to be purchased are those of a company organized only last year when the shipping industry was in great favor, and certainly far more sanguine views of business prospects were then taken than are common at present. As significant of what is to come, however, the transaction is full of suggestiveness."

England frankly sees in this purchase by Morgan the set purpose of the industrial leaders of the United States to rehabilitate the American merchant marine. The total value of imports into the United States forty years ago was $338,768,130, of which amount $216,123,428 were carried in American vessels, making 68 per cent. of the whole. At that time also 70 per cent. of the exports were carried in American ships. In 1900 only 7 per cent. of the enormous export trade of the United States went abroad in American bottoms. It is not at all likely that the forces back of the United States Steel Corporation will permit this condition to exist. This corporation is beating the world in the manufacture of steel. Why? Chiefly because it is in possession of cheap raw material—the word cheap meaning its actual cost delivered at the furnace. Steel is the raw material of the ship. With the cheapest steel in the world what is to prevent the steel corporation from turning some of it into ships, in order that its surplus products may go abroad at a freight rate which will enable them to compete with foreign products? A few ships are, of course, needed in the beginning to build up an organization for which the ships will be built at home in the future.

The record has been broken. In all the discussion attending the struggle over the shipping bill in the last congress, and in all the statistics on the subject that have been published during several years past, there is nothing so forcible as a few facts from "Commerce and Navigation for 1900" in showing the decline of our foreign shipping. It is learned from this volume, just issued by the United States treasury department, that in the trade between Europe and the United States during the last fiscal year ended June 30, 1900, not one American merchant vessel went to or came from Germany, Russia, Sweden and Norway, Denmark, the Netherlands, Italy, Austria-Hungary, Greece, Turkey. Two small American vessels came to the United States from France, one in ballast; one American sail vessel came from Belgium in ballast, and one American vessel cleared for Spain. There cleared for or entered from the United Kingdom eleven American sail vessels, and two small steam vessels went to the United Kingdom in ballast. The American flag was never before such a rarity on the North Atlantic between the United States and Europe. Even during the year of President Jefferson's embargo (1808) and during the nearly two years cruises of the Alabama (1862 to 1864) the American flag was to be seen in these waters many times over the showing for the fiscal year 1900. The mail steamships St. Louis, St. Paul and New York were practically all we had last year on the North Atlantic.

Capt. J. E. Bernier, who is planning to reach the north pole, finds that the appropriation allotted for the purpose by the Canadian government is not sufficient and has appealed to the public for subscriptions. Of course a north pole expedition is not a dividend-paying concern and all subscriptions must be for the cause of science only. It is a pity that the Dominion government has not allowed a sufficient sum for this purpose and saved the hardy explorer the necessity of appealing to an indifferent public. Governments will go on looking for the north pole until it is reached. Nothing will be gained by reaching it except an addition to the sum of knowledge. But there never has been a polar expedition yet which has not enriched the pages of science. It is likely that future expeditions will discover truths of permanent value. Men are better equipped now for registering their discoveries. It is possible to take along specialists in various departments of research, and therefore whatever discoveries are made may have the invaluable stamp of authority upon them. These enterprises are properly a governmental function and money may legally be expended from the public treasury for them. It is too often the case, if left to private enterprise, that the man who has the ambition to undertake the expedition, has not the means to equip it. Governments frequently are lavish with funds for more doubtful objects. It is to be hoped that sufficient public sentiment will be aroused to induce the Dominion government to give Capt. Bernier the necessary sum.

At a trade school meeting the other evening Mr. Charles M. Schwab, president of the United States Steel Corporation, said:

"The boy in business who starts with a manual school education at seventeen or eighteen years of age will get a start that the boy who goes through college will never catch up with, other things being equal."

Granting Mr. Schwab's premise, that the making of money is the chief object of life, he is doubtless right. A college education is not necessary to make money. The great money getters have not been college men. But it is doubtless true that many men, foremost in commerce, finance and industry, would freely give millions to get that which the college boy got during his four years at college. There probably isn't a man living who started in life at sixteen or seventeen that doesn't feel his handicap and that isn't pitifully conscious of his educational limitations. The benefit of a complete education is not what one learns in college. Anyone might by desultory reading acquire the information. It is the mental discipline one receives that is the incalculable benefit; the endowment of a mind trained to understand and to discuss the great questions which bear upon life. One does not need such a mind to make money, but one does to make life complete.

INTERVIEW WITH HEAD OF ATLANTIC TRANSPORT CO.

President Bernard N. Baker of the Atlantic Transport Co. has returned to the United States from England, where, as is well known, he was in consultation with J. Pierpont Morgan. Immediately upon his arrival he was asked whether it was the intention to consolidate the Leyland and the Atlantic Transport lines.

"Well, now, if you were in my place would you tell the newspapers all about such a scheme if you had it in view?"

It is just common sense that Mr. Baker cannot talk upon such a subject. Nevertheless there is every reason to believe that these two lines will be consolidated. It is no secret that the endeavor to consolidate them has been made hitherto.

"If the Leyland and Atlantic Transport lines were merged, and I do not say that they are, they would do practically all the carrying trade in passengers and freight to London," said Mr. Baker.

Mr. Baker then entered seriously into a discussion of the freight business between the United States and London. He said:

"The Leyland and Atlantic Transport lines land at the London docks from American ports about 100,000 tons a week, or putting it roughly, 5,000,000 tons a year. To handle this freight at an American dock costs about 25 cents a ton. By the antiquated methods they have in London it costs nearly three times as much. I have plans here in my desk made by engineers whom I took to London with me for the construction of new docks over there by which we can load and discharge cargo at one-third of the present cost. The docks will have to be practically rebuilt at a cost of perhaps $12,000,000. If, after the reconstruction of the docks, the Leyland and Atlantic Transport lines should combine they would be able to pay a large percentage on the investment, simply through the saving of money spent in discharging and loading freight. Of course we would have to employ labor-saving machinery such as is used here. The English labor unions will not let their employers do this in London. The primitive way they discharge freight has been censured by the British themselves. They unload it from a steamship to a barge, then transport it to another place for weighing and finally transfer it to another barge for delivery."

The Atlantic Transport Co. has at present eight vessels building—two at the Maryland Steel Co.'s yard, Sparrow's Point, Md., four at the yard of the New York Ship Building Co., Camden, N. J., and two at Belfast, Ireland.

Capt. W. W. Brown of Cleveland is secretary of the Globe Navigation Co., which recently purchased from Messrs. Hawgood of Cleveland the steel steamers Tampico, Eureka and Meteor, vessels of Canadian canal dimensions, (about 3,000 tons capacity), built by the Craig Ship Building Co. of Toledo. The Globe Navigation Co. is controlled by stockholders in the east, but the headquarters will probably be in Seattle, as the vessels are to be operated in the future on the Pacific coast. The Tampico and Eureka left Norfolk several days ago with Pocahontas coal for the Mare Island navy yard in California, and the Meteor, which has passed down the St. Lawrence from the lakes, will soon follow them as she is to begin loading in Baltimore about Sunday next. Capt. K. A. Jensen, who sailed the Tampico on the lakes, is still in command of her. He was not a salt water man but studied navigation while on the lakes and had little difficulty in securing master's papers shortly after he took the ship to the Atlantic seaboard last spring.

An effort to merge into one company the dredging concerns of the great lakes is meeting with success. It is understood that options covering practically all the property of the dredging companies have been secured and that the work of appraisement is well under way. If the undertaking is successful—and it is now more than probable that it will be—the headquarters will probably be in Cleveland.

The Newport News Ship Building & Dry Dock Co. has notified the navy department that the battleship Illinois will be ready for her official trial on June 20. The trial will take place on the course between Cape Ann, Mass., and Cape Porpoise, Me.

SCOTCH SHIP BUILDING.

OUTLOOK MORE ENCOURAGING THAN IT WAS A MONTH AGO—THE COAL DUTY AND OTHER MATTERS OF INTEREST, IN A LETTER FROM GLASGOW.

[Special correspondence to the Marine Review.]

Glasgow, Scotland, May 8.—Were it not for the disturbances and uncertainties in the coal trade the prospects for ship builders might have been called brighter today. Last month considerably more orders were booked by Scotch ship builders than the tonnage of the vessels launched, whereas in the three preceding months the reverse was the case. The launches in April were twenty-three vessels of 31,242 tons, comparing with twenty-one vessels of 36,730 tons in March, and with twenty-seven vessels of 26,545 tons in the corresponding month of last year. Of this total nineteen vessels of 27,462 tons were contributed by builders on the Clyde, while Forth builders contributed one vessel of 1,400 tons, the Tay builders one of 1,200 tons and Aberdeen builders two of 1,180 tons. The month's output brings up the total of the four months of the year now expired to 143,592 tons. Below is a comparative record of the output during the last twelve years:

OUTPUT OF APRIL AND FOUR MONTHS INCLUDING APRIL.

Year.	April, tons.	Four months, tons.
1890	47,699	145,520
1891	31,948	121,940
1892	40,350	145,490
1893	20,670	74,660
1894	33,780	97,970
1895	29,145	91,106
1896	42,230	140,110
1897	26,925	90,530
1898	46,200	128,750
1899	40,885	158,825
1900	26,545	126,475
1901	31,242	143,592

The four-month output is the largest since 1892, with the sole exception of 1899, but the month's output has been several times exceeded since 1892. Among the products of the month were the challenger for the America's cup, Shamrock II., built for Thomas Lipton, by Messrs. Wm. Denny & Bros., Dumbarton. She is classified as a racing yacht of 200 tons measurement. Most of Shamrock II.'s predecessors were built by Messrs. D. & W. Henderson & Co., Meadowside, who also built the famous Britannia for King Edward when he was Prince of Wales, and the German emperor's Meteor (formerly Thistle).

There was no very large item among the products of April, one of the largest being the Calabria, a screw steamer of 4,500 tons, with triple expansion engines, built for the Anchor line, by Messrs. D. & W. Henderson & Co. Of about the same tonnage is a boat called the City of Delhi, built by Messrs. Barclay, Curle & Co., Whiteinch, Glasgow, for the famous "City" line, between Glasgow, London and Calcutta, owned by Messrs. Geo. Smith & Sons, Glasgow. Another item is a cargo liner of 4,350 tons, built by Messrs. Napier & Miller, Ltd., Glasgow, for a Glasgow firm. Of the tramp order are a boat of 3,360 tons, built by Messrs. Wm. Hamilton & Co., Port Glasgow, for German owners; a boat of 1,400 tons, built by Messrs. Murdoch & Murray, Port Glasgow, for London owners; another boat of 1,400 tons, built by the Grangemouth & Greenock Dock Yard Co., Grangemouth, for English owners; a boat of 1,250 tons, built by Messrs. Mackie & Thompson for English owners; a boat of 1,200 tons, built by Messrs. Gourley Bros. & Co., Dundee, for Dutch owners; a boat of 1,180 tons, built by the Welsh Ship Building Co., Troon, for Irish owners; a twin screw of 1,000 tons, built by Messrs. A. Rodger & Co., Port Glasgow, for the fresh meat trade of the River Plate; a cargo and passenger boat of 980 tons, built by Messrs. Hall, Russell & Co., Aberdeen, for the north of Scotland & Arkney & Shetland Steam Nav. Co.; a well-decker of 320 tons, built by the Ardrossan Ship Building Co., for the east coast fishing; and a twin screw of 150 tons, built by Messrs. Flemming & Ferguson, Ltd., Pailsey, for government service in New Zealand. A notable item is the Brilliant, a four-masted steel sailer of 3,900 tons, built by Messrs. Russell & Co., Port Glasgow, for the Anglo-American Oil Co. Messrs. Lobnitz & Co., Renfrew, contributed a suction dredger of 1,000 tons for foreign owners. Messrs. Alexander Hall & Co., Aberdeen, launched a steam trawler of 200 tons for the Scotch fisheries. Messrs. Napier & Miller, Yoker, Glasgow, launched a small gunboat for the Republic of Brazil. The remainder of the tonnage was made up of yachts and barges. The feature of the month's output is the large proportion of the "cargo tramp" order, a class of vessel building which has now received rather a check by the decline in freights.

The new contracts booked during the month are estimated to amount to 65,000 tons, and do not include many of the "tramp" order; in fact, the most of the orders are for the regular lines. For instance, Messrs. Caird & Co., Greenock, are to build two steamers of 6,000 tons each for the Pacific Steamship Co.; Messrs. Wm. Denny & Bros. a twin screw for passenger service of the London & Northwestern Railway Co.; Messrs. A. & J. Inglis a passenger boat for the Glasgow & Dublin Steam Packet Co.; the Caledon Ship Building Co., Dundee, a boat for the Australasian United Steamship Co., and so on. Then the Grangemouth & Greenock Co. have contracted for two cargo liners of 4,000 tons each for London owners, two boats of 2,500 tons each for Spanish owners, and a boat of 4,000 tons for Grecian owners. The Anglo-American Oil Co. has ordered one 6,000-ton sailer from Messrs. A. Rodger & Co., Port Glasgow, and another from Messrs. Russell & Co., Port Glasgow, which latter firm is also to build a 6,500-ton oil steamer for the Manhattan Steamship Co. The rest of the bookings are of a miscellaneous character.

Besides the reported contracts there is reason to believe that several ship builders have booked a good deal more, for there has been a lot of buying lately of ship plates. One hears no more of American plates coming in, but even though Scotch makers have been accepting less than £6 per ton, some English plates are competing in this market. It cannot be very profitable work at present wages and prices of raw material. The steel workers in Scotland have agreed to accept a reduction of 10 per cent. in their wages, so that the trouble feared has been averted, but in other branches of the iron trade wages are still too high.

In industrial circles, however, the absorbing theme of interest is the coal duty, and the threatened action of the miners with regard to it. The duty itself is not large and it is levied only on the quantity actually exported for sale, not what is supplied for the use of steamers leaving on a foreign voyage. According to the chancellor of the exchequer, the duty will fall upon the consumer abroad. According to the miners it will fall upon them, because, they say, the coal owners will lose their foreign business unless they allow a shilling off for the duty to exporters. If the export business falls off there will be less employment for them, and if the export business is retained by conceding the shilling duty it will be taken off their wages. Therefore, they denounce the impost as prejudicial to the trade of the country and highly detrimental to them, and they are threatening to organize a stoppage of all the collieries in the country until the obnoxious tax is withdrawn. This is not the mere bluff and bounce of labor stump orators, but the deliberate resolution of the miners' federation, as approved by moderate men like the parliamentary representatives of the north of England miners. Whether, however, the resolution can be carried out is doubtful, and it is not in the least doubtful if carried out the stoppage will be in the highest degree injurious to trade. In fact a stoppage of all the pits in the country even for a fortnight would be something like a national catastrophe, and iron and steel makers and other large consumers are watching the developments with anxiety. Some of them are inclined to think that the export coal duty should have the effect of cheapening coal to them by throwing more on the home market, but others think that the duty will eventually be laid on the home price, in order that special prices may be made for export.

The City of Delhi mentioned above is the thirty-second vessel which Barclay, Curle & Co. have built for the "City" line during the last fifty years. She is 397 ft. in length, 48 ft. 9 in. in breadth, and 29 ft. 9 in. in depth. Her tonnage is 4,500 gross and her engines are triple expansion, with cylinders of 25 in., 41 in. and 67 in. by 48 in. stroke. There are three single-ended boilers working at 180 lbs. pressure and fitted with Howden's forced draft. The vessel is schooner-rigged and has very complete arrangements for working of cargo. The Calabria mentioned among launches above is for the Italy and New York service of the Anchor line. She had her steam trials this week and developed a speed of 15 knots. Her dimensions are: Length, 390 ft.; breadth, 47 ft.; depth, 30 ft. 6 in. Her triple expansion engines have cylinders of 31 in., 50½ in. and 84 in., with a 4½ ft. stroke.

The first launch in May is a new liner, built by Chas. Connell & Co. for South African service—a vessel of 385 by 50 by 29 ft., of 4,750 tons and 2,500 I.H.P.

Measured-mile speed trials of Torpedo Boat Barney for standardization of screws.

Trials recently run over Southport course. U. S. S. Barney is first-class torpedo boat, built by Bath Iron Works, Bath, Me. She is 157 ft. long and 17 ft. beam, and on the trial had a draught of 59 in., mean, which gave a displacement of 168 tons. At full power, when indicating over 4,000 H. P., the steam pressure in the first receiver was 227 lbs.; second receiver, 97 lbs.; third receiver, 30 lbs. The temperature of injection water was 47°; delivery, 75°; hot well, 180°; feed water, 240°.

Number of run.....	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Rev. per min. S.....	123.5	163.4	162.8	217.6	208.1	231.7	231.6	249.3	254.9	290.7	286	301.8	305.1	302.5
Rev. per min. P.....	125.3	161.4	160.9	203.6	201.3	234.8	237.4	261.7	265.3	300.9	300	289.2	303	306.1
Rev. per min. mean....	124.4	162.4	161.8	210.6	204.7	233.3	234.5	255.5	260.1	295.8	293.2	295.5	304	304.3
Speed, knots, mean....	11.95	15.04	15.23	18.87	18.64	20.69	21.05	22.73	23.53	26.55	26.67	26.55	27.59	27.37
Steam press. boil.....	200	193.5	190	182.5	196	195	207.5	204	208	230	230	230	230	230
Vacuum in cond. S....	25.5	26	25.75	25.25	25.5	25.5	25.5	25.25	25	23.75	24	22	22	23.5
Vacuum in cond. P....	22.5	24.25	24.75	24.25	24.75	24.25	24.5	24.25	24	23.5	22.87	23.5	23.5	——
Air press. fire room, ins. S.....	0	.75	——	——	——	——	——	——	——	6.25	6	6	6	——
P.....	.25	0	1.5	1.5	1.25	1	1.375	2	4.25	4.87	5	4.75	4.37	——
Indicated H.P. S.....	148	333	325	866	723	961	1001	1165	1243	1948	1782	2143	2082	——
P.....	150	286	291	530	564	971	1017	1394	1451	1922	1999	1863	1848	No card
Total	298	619	616	1396	1287	1932	2018	2559	2694	3870	3781	4006	3930	——

DEVELOPMENT OF SHIPPING AT SEATTLE.

Mr. Frank Waterhouse, president of the British-American Steamship line, and general western agent of the China Mutual Steam Navigation line, was interviewed in New York lately upon the contemplated improvements in shipping facilities and vessel service from Seattle. He said:

"We have a service which will sail a steamship every three weeks out of Seattle and employ sixteen vessels. The four new steamships will be in addition to the sixteen just referred to, and construction will begin on them at once. They will be of 17,000 tons each, having a speed of 16 knots, and limited passenger accommodation. The vessels will be cargo carriers of the most modern type and will be the finest crossing the Pacific. Two of them will be built by Workman & Clark at Belfast and two in the yards of Henderson Bros., Glasgow. We have also decided to build large wharves. They will be situated one mile south of the Great Northern wharves at Inter bay. The wharves will be similar to those built by the Great Northern two years ago."

QUESTION OF BRIDGES.

A DISCUSSION OF ADVANTAGES OF THE BASCULE OR ROLLING LIFT BRIDGE OVER OTHER MOVABLE STRUCTURES—A SUBJECT OF SPECIAL INTEREST TO CITIES OF THE GREAT LAKES.

Nearly one-third of the total wealth of the United States has been accumulated during the past ten years. The growth of wealth in the United States during the present decade will be much greater. By some it has been estimated as high as $30,000,000,000 to $40,000,000,000. The growth of commerce, vessels and tonnage on the great lakes typifies and expresses this enormous growth of wealth. The population and commerce of the cities upon the great lakes have also grown in proportion, in some cases even exceeded the proportionate growth of the wealth of the United States. Some of the more progressive cities of the lakes are preparing for the larger growth of commerce during the present decade by the extension and improvement of their internal harbor facilities, and are removing all obstructions in the way of rapid and easy communication for the largest lake and ocean carriers likely to enter the different harbors for many years to come. In the present competition for business among marine ports, only those ports can maintain their commerce and prosper which offer the best facilities for the largest vessels to reach directly, without re-handling, delays or lighterage charges, the manufacturing plants, railroad terminals, docks and warehouses located on low-priced real estate. These industries require large areas of real estate, and are constantly expanding. They are usually to the best advantage located inland. They must be easily accessible by the largest vessels, and, as the vessels must usually pass a number of movable bridges in their course, it is very important that these movable bridges should offer the least possible obstruction and delay to the passage of the vessels. The swing bridge, at the time of its origin and during the earlier periods of marine commerce, when vessels were small and real estate was not so valuable and cities were not so populous as at the present time, offered no serious obstruction to navigation, but at the present time its many deficiencies and anomalous character are becoming universally recognized, especially by marine interests, who have to pay with both time and money for the delays and damages caused by the swing bridges.

GOVERNMENT OPPOSED TO SWING BRIDGES.

The United States war department has refused for a number of years to permit any new swing bridges to be built at Chicago, and all of the existing swing bridges—about fifty in number—are being replaced by bascule bridges as rapidly as possible. The new rolling lift bridges are of sufficient span to give a clear waterway 140 ft. wide between protection fenders, or wide enough to rapidly pass two of the largest lake carriers side by side. At Cleveland several swing bridges are now being replaced by rolling lift bridges, giving a clear channel for navigation 110 ft. to 120 ft. in width. Several small bascule bridges have been built at Milwaukee giving channels 70 ft. wide, while several new ones are about to be constructed with channels of approximately the same width. Other great lakes ports are also arranging to meet modern requirements so as not to lose their existing commerce, but the wide channels being provided by the rolling lift bridges at Chicago will be ample to also accommodate the larger ocean vessels which are certain to seek entrance if the hope of an adequate waterway from the great lakes to the Gulf of Mexico or to the Atlantic ocean is eventually realized. At Boston and other ocean ports swing bridges have been and are being removed and replaced by bascule bridges, and the demand for rolling lift bridges has also extended to Russia and Japan, where the superiority of the modern rolling lift bridge finds ready recognition.

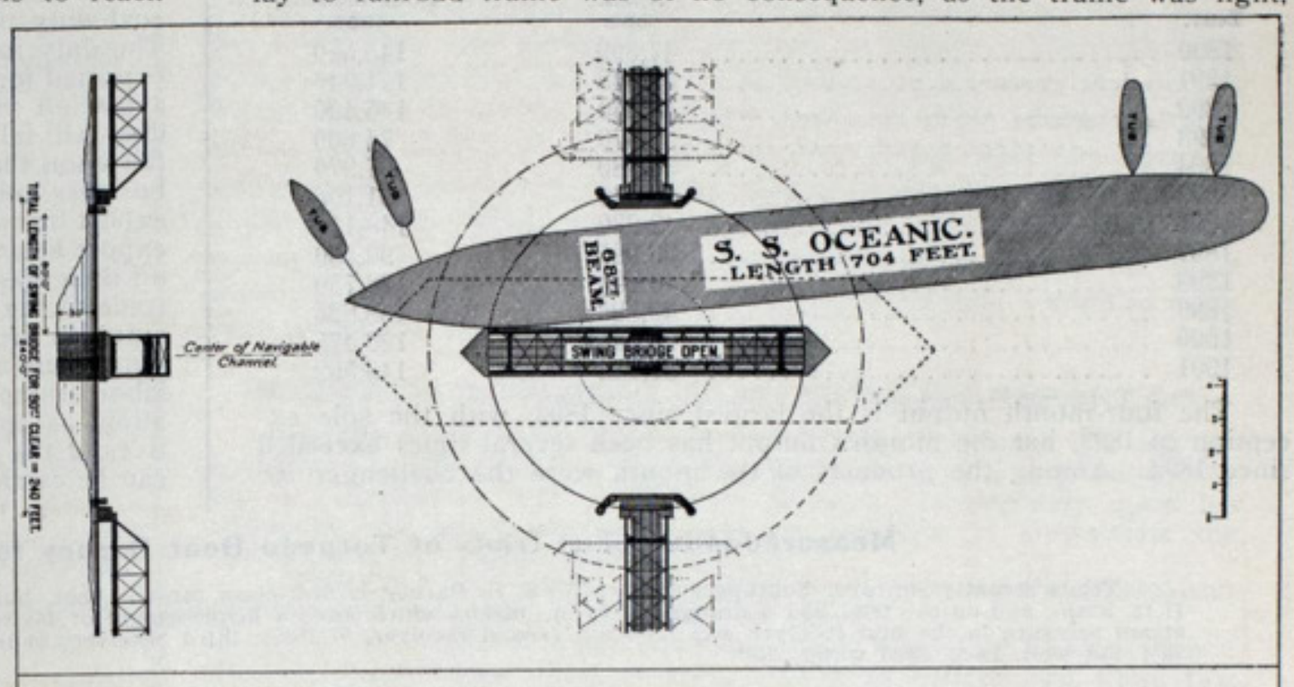
At all important and progressive ports the center pier swing bridges must be removed, so as not to obstruct navigation and to meet the present and rapidly expanding requirements demanded of a movable bridge. The success of the many rolling lift bridges in operation and the fact that the rolling lift bridge is rapidly replacing many swing bridges indicates that the swing bridge has outlived its period of usefulness and that it cannot be adapted to meet modern conditions without a waste of money, time and energy. The diagram herewith shows eight typical swing bridges and also shows eight typical Scherzer rolling lift bridges. One of the most striking features illustrated by the diagrams is the fact that the Scherzer bridges provide one channel for navigation in the center of the waterway of any width desired, whereas the swing bridges obstruct the center or best part of the waterway with large piers and protections, and divide the waterway into two narrow channels and compel the spanning of two channels where only one adequate channel is required. The swing bridge moves over valuable dock and water space and in some cases, as at Adams and Jackson streets, Chicago, the land over which the bridge swings is worth many times the cost of the bridge. The Scherzer rolling lift bridge, on the contrary, moves in a vertical direction and within the line of the roadway, and therefore it does not interfere with and damage either dock or property rights.

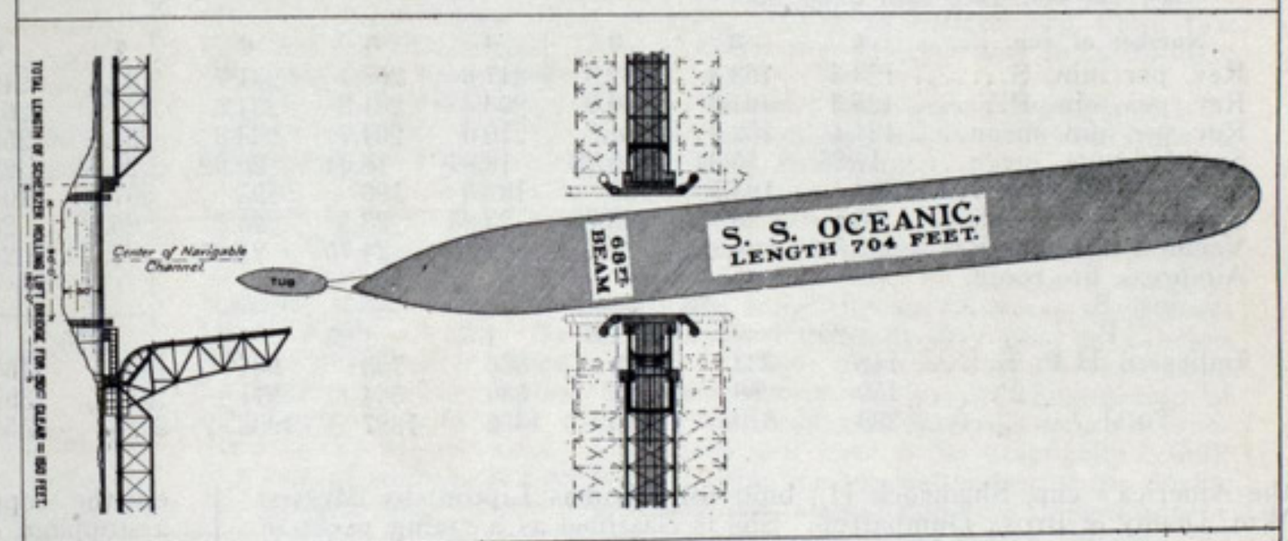
Railroad companies, street railway companies and municipal corporations are as vitally interested, as are marine interests, in securing a bridge which will offer the least possible obstruction to navigation, and the following statement contains some of the reasons why the rolling lift bridge has been adopted so extensively:

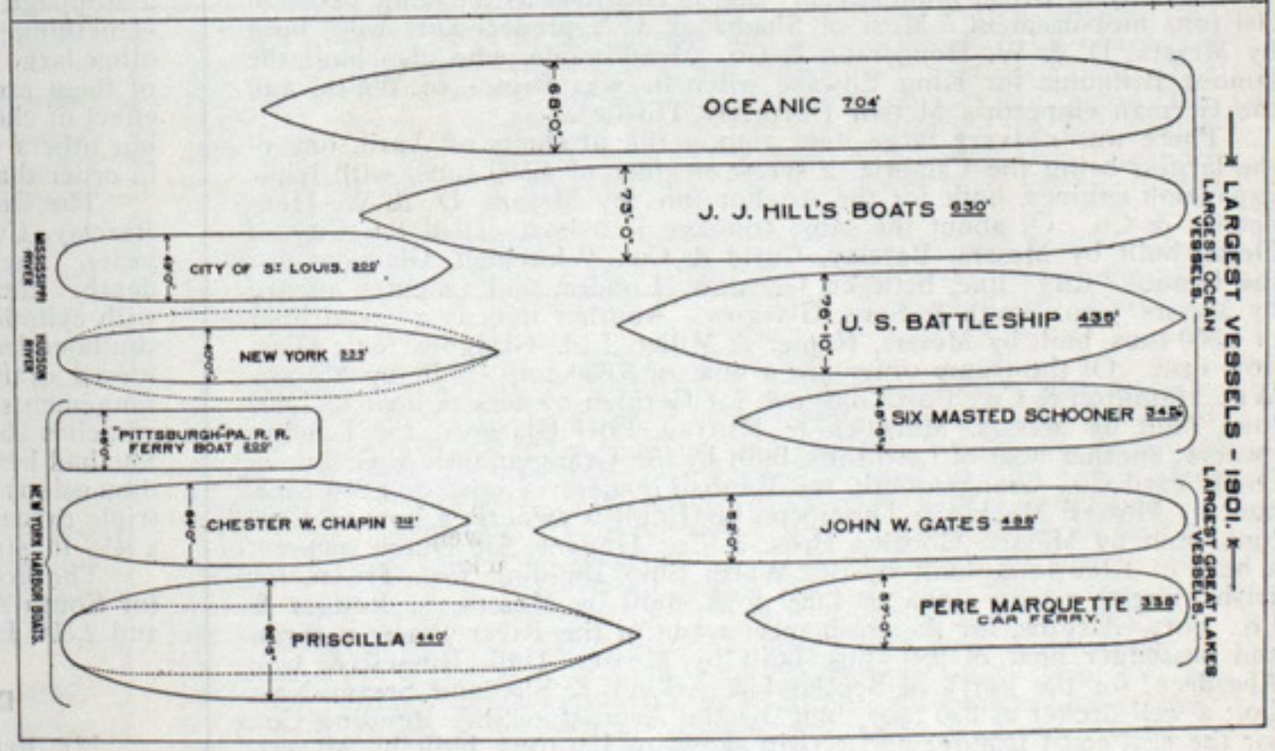
RECOGNIZED ADVANTAGES OF THE ROLLING LIFT BRIDGE.

Movable bridges are becoming of greater importance each year to railroad companies because of increased railroad traffic, increased number and speed of trains, and the ever increasing number of tracks required and also because of the increased number and size of vessels to be accommodated. It is imperative that delays or obstructions from this source should be reduced to a minimum. The horizontal draw or swing bridge was evolved and came into extensive use because the more primitive form of movable bridge—the hinged-pivot or trunnion bascule bridge, which was the more scientific in principle—greatly increased in difficulty and cost of construction with each increase in the length of span required to accommodate the increasing width and length of vessels. The swing bridge type differed fundamentally from the bascule bridge in that the main supporting pier occupied the center or the best part of the navigable channel, and divided the waterway into two passages, instead of providing one adequate passage in the center of the channel. Where only one channel for navigation is required, the swing bridge must be made of double length, and the channel is divided into two parts by the center pier and swing protection, which occupy the center and most efficient part of the navigable waterway.

The swing bridge in moving swings outside of the roadway over land, water and docks, instead of moving entirely within the roadway, as is the case with the bascule bridge. These were not serious objections to the swing bridge in the early days of railroad construction and development, because vessels were comparatively small and infrequent. The delay to railroad traffic was of no consequence, as the traffic was light,





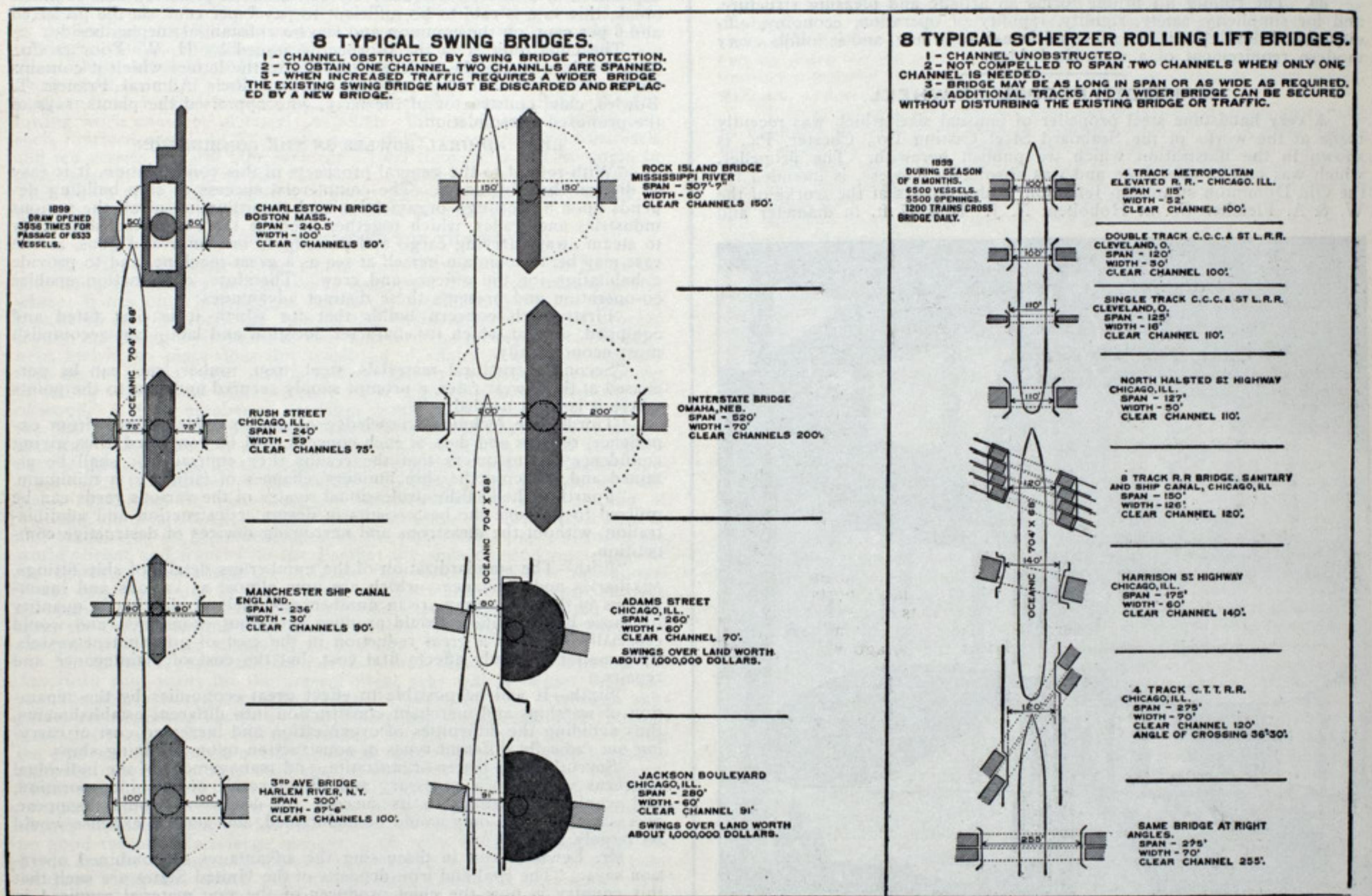


trains were few in number, and single tracks were sufficient. As vessels increased in size and number, the old swing bridges were discarded and new ones built with longer spans, without departing from the original forms of the swing bridge type. This type of bridge became so common that it was regarded as the only feasible type of movable bridge for railroad and highway traffic across navigable waterways. Its many limitations and anomalous character in the science of engineering were not fully recognized until the increased railroad and water traffic in the United States produced conditions which the swing bridge type was wholly inadequate to meet and which conditions led to the invention and use of the Scherzer rolling lift bridge, or bascule bridge type. With this type of bridge the engineer is not compelled to lengthen the movable span and bridge two channels, where only one is required; he is not compelled to obstruct the center and best part of the navigable channel by a center

pier and by a long and wide protection pier, the construction and maintenance of which are expensive. The diagram presented herewith shows a swing bridge open and a large vessel passing through the draw, and forcibly illustrates the obstructive character of the swing bridge protection and the delay which is caused to railroad traffic by the slow passage of vessels on account of the swing protection. It also shows that any increase of railroad traffic requiring an increase in the number of tracks across the channel compels the discarding and removal of the existing swing bridge and also the approach spans and piers. Additional tracks always compel the construction of a new, longer and wider swing bridge, with a larger and more obstructive center swing protection. Many swing bridges have been discarded for this reason only, and have been replaced by new and large swing bridges, which will in turn have to be discarded as the traffic of the railroad increases. It also necessitates the building of a temporary movable bridge and the diversion of the traffic around the new swing bridge. These expensive and wasteful processes are not necessary with the Scherzer rolling lift bridge.

Another diagram shows a Scherzer rolling lift bridge on a similar scale for similar conditions. It clearly shows that a single channel can be provided of any width desired without bridging two channels, thus enabling a considerable saving in the total length of the movable bridge required. It shows the center of the channel unobstructed, giving a wide angle of movement for the passing vessel, enabling it to pass the bridge rapidly, and causing the least possible delay and obstruction to railroad traffic. It also shows that any number of additional railroad tracks can be carried across the channel without discarding or removing the existing bridge, the approaches or piers, and also without disturbing or delaying the existing railroad traffic. The additional spans can be erected on the piers in an upright position, rapidly and without interference with navigation.

The diagram also illustrates the extreme safety of the bridge in the open position against wind pressure, the bulk of the weight being in the counter-weight and segments near or below the tracks. It is, therefore, safer than any high modern office building.



NEW CONDITIONS FORCE ABANDONMENT OF THE SWING BRIDGE.

The swing bridge served its early purpose well, but it is no longer adequate, efficient or economical, or the best movable bridge to meet the expanding tendencies of modern railroad traffic, due to enormously increasing population and production, because:

1. Constantly increasing railroad traffic demands an ever increasing number of parallel tracks, especially at cities and harbor terminals.
2. Increased water traffic has called into service a large increase in the number of vessels and also longer and wider vessels.
3. The increased width of vessels has required wider channels, and necessitates the construction of longer spans for movable bridges.
4. The increased number of vessels requires more frequent openings of movable bridges, and consequently causes more frequent delays to trains and traffic.
5. The increased length of vessels increases the time of delay to railroad traffic during the passage of each vessel.
6. The channels of waterways and harbors are being deepened and improved, docks, land and water rights are becoming more valuable.

The cost of a movable bridge increases with each increase in the width of the clear channel spanned. It is, therefore, desirable to provide only one channel in the middle of the waterway, wide enough to rapidly pass either singly or side by side the largest vessels likely to use the channel, the width of the channel to be determined by the importance of the river, canal or waterway. The diagrams show the length and width of the largest vessels likely to use the waterways and harbors of the United States for a number of years to come. Briefly some other advantages of the rolling lift bridge are as follows:

1. The supporting piers may be on shore; no center and protection pier necessary.
2. Channel unobstructed.
3. It is not necessary to bridge two channels where only one channel is required, as is the case with the swing bridge. This greatly shortens the length of bridge required.
4. The unobstructed channel may be any width desired, even 1,000 ft. wide.
5. The bridge moves vertically within the lines of the roadway, no dock space being wasted or no extra land or water space being required in moving the bridge.
6. The navigable channel of a canal or waterway must be widened in order to provide space for the swing bridge and pier obstruction, and two channels must be dredged and maintained. This is entirely unnecessary with the rolling lift bridge.
7. The first cost and the large cost of maintenance of the protection pier of the swing bridge is entirely saved by the rolling lift bridge.
8. The rolling lift bridge may be as wide or as narrow as desired.
9. A number of rolling lift bridges may be placed side by side and operated singly or jointly.
10. Increasing traffic requiring additional railroad tracks may be accommodated by adding additional single or double-track rolling lift bridges to the existing rolling lift bridge. This is impossible with the swing bridge, as it must be discarded and removed whenever increased traffic demands a wider bridge.
11. Railroad and highway traffic is delayed because vessels move slowly and with difficulty on account of the obstruction of the protection pier and the narrow openings provided.
12. The delay to railroad and highway traffic is reduced to a minimum with the rolling lift bridge, because the single opening in the center of the channel without a pier obstruction permits the rapid and easy movement of vessels.
13. Time is also saved, because the rolling lift bridge is opened or closed more rapidly than any swing bridge; usually within thirty seconds.
14. Time is also saved, because tugs and small craft require only a partial opening of a low bridge.
15. The rolling lift bridge may be a simple truss, an arch or a cantilever span, and is absolutely safe for the heaviest loads and longest spans required.
16. When opened, a rolling lift bridge is safer against wind pressure than a modern high office building, because the bulk of the weight is in the rolling segments and counter-weights at or below the roadway. In case of cyclone it may be closed and placed out of danger.
17. The bridge is at rest when opened at an angle of 40 degrees. The

movable parts cannot fall and injure the bridge or a passing vessel by falling.

18. The roadway of a rolling lift bridge can be at any desired height.

19. The rolling lift bridge may be either a single or double deck structure.

20. The bridge is economical to construct and maintain.

21. The navigable waterway is crossed by the shortest possible movable span.

22. The large rollers are the most perfect known mechanical device to overcome friction.

23. The bridge may be operated by electrical, steam or gas motors, or by hand.

24. Little power is consumed in operation.

25. Even a six-track bridge is operated by one man.

26. Accidents are impossible, because the bridge closes the roadway when open.

27. The erection of a rolling lift bridge is rapid and economical, and need not obstruct or delay either railroad, highway or vessel traffic.

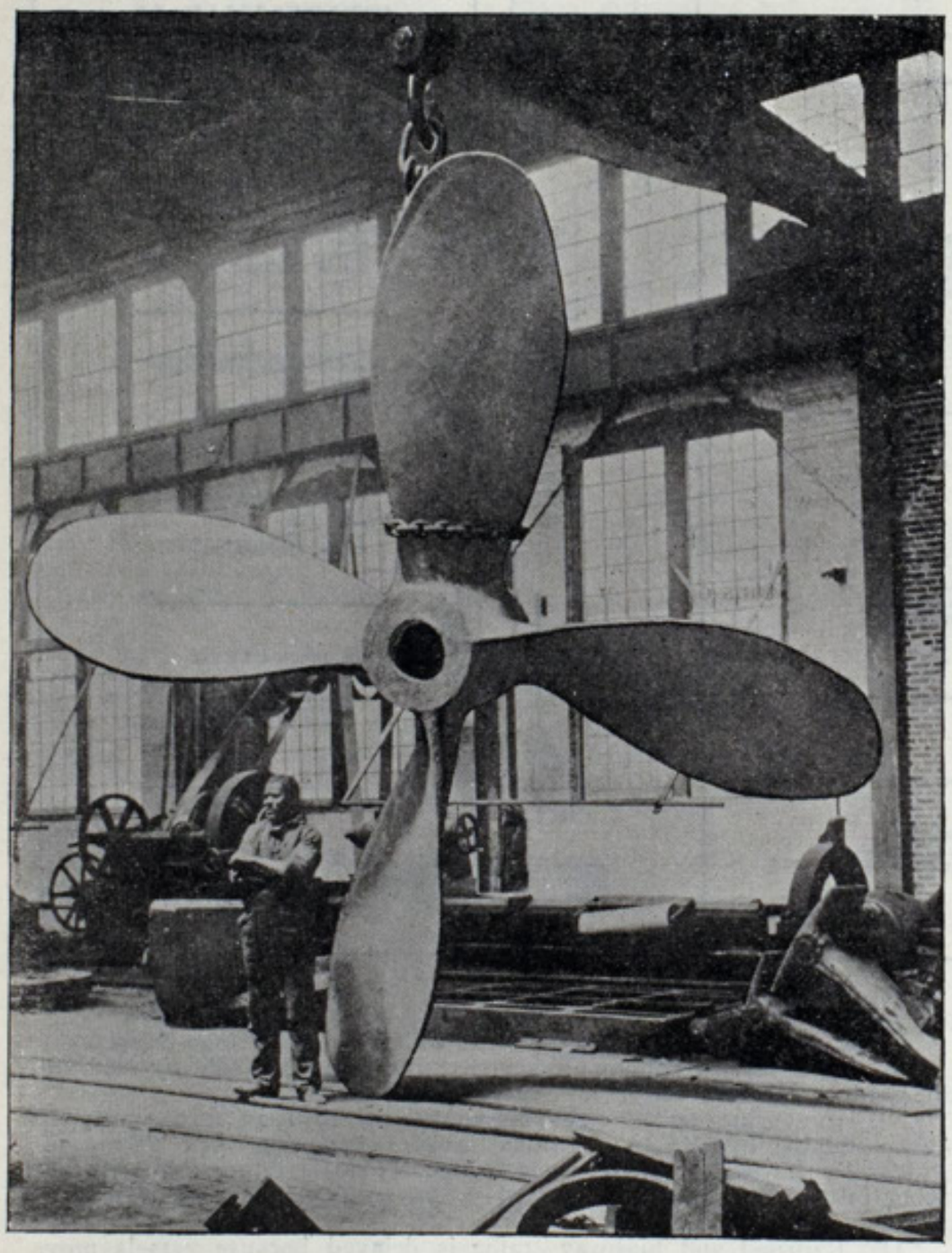
28. The substructure of a rolling lift bridge costs less than the substructure of a swing bridge.

29. The wide angle of movement always possible for a vessel passing through a rolling lift bridge is especially valuable in a curved channel. This is impossible when a swing bridge is used with the usual long swing protection occupying the center of the curved channel.

30. The rolling lift bridge forms an artistic and pleasing structure, and for simplicity, safety, rigidity, rapidity of operation, economy, efficiency and durability it has no equal in use anywhere, and it fulfills every modern requirement of a movable bridge.

MAMMOTH PROPELLER WHEEL.

A very handsome steel propeller of unusual size, which was recently made at the works of the Seaboard Steel Casting Co., Chester, Pa., is shown in the illustration which we publish herewith. The propeller, which was cast in one piece and was absolutely flawless, is intended for the Old Dominion steamship Jefferson, under repairs at the works of the W. & A. Fletcher Co. at Hoboken, N. J. It is 17 ft. in diameter and



weighs about 19,000 lbs. It was molded, dried, cast and finished by the Seaboard foundry in about two weeks, and is considered one of the finest steel propellers ever made.

The Seaboard Steel Casting Co. has a great deal of marine work under way at its large foundry. Among the contracts on hand are hull and engine castings for nearly all of the ship building concerns in the country. Over 300 men are at work and the daily output exceeds sixty tons of finished castings. A visitor to the works is impressed with the ease with which enormous castings like the propeller wheel above referred to and the giant stem and stern posts for ships, immense hydraulic cylinders, etc., are handled by the traveling cranes and delivered to any part of the foundry or machine shops. It is a very complete plant and its work is earning for it a famous reputation.

Subscribers to the Review who wish it sent to them in care of the marine post office at Detroit during the season of navigation should notify us at once, as changes will not be made on the strength of what may have been done in past seasons.

WILL HAVE AN ENORMOUS CAPACITY.

THE UNITED STATES SHIP BUILDING CO. COULD DUPLICATE THE ENTIRE NAVY OF THE UNITED STATES WITHIN FOUR YEARS—ITS ADVANTAGES DISCUSSED BY SHIP BUILDERS OF NOTE.

The Review in its last issue contained the essential plan of the organization of several coast ship yards into one corporation, to be known as the United States Ship Building Co. These yards and independent industries are: Newport News Ship Building & Dry Dock Co., Newport News, Va.; the Union Iron Works, San Francisco, Cal.; the Bath Iron Works, Ltd., and the Hyde Windlass Co., Bath, Me.; Lewis Nixon's Crescent Ship Yard and the Samuel L. Moore & Sons Co., Elizabethport, N. J.; and the Canda Manufacturing Co., Carteret, N. J. A prospectus dealing with plans of the proposed consolidation says that the several plants will have a total annual capacity of 380,000 tons, exclusive of general repair, dockage and collateral work, and when working at full capacity will employ about 24,000 men and consume about 275,000 tons of steel annually. The aggregate orders of the several companies now on hand exceed $63,000,000, covering an average of eighteen months for completion, on which the estimated profit is over $7,000,000. The future annual net earnings are estimated at $5,778,500, and as the corporation is capitalized at $65,000,000, equally divided between preferred and common stock, this sum is said to be sufficient to pay 7 per cent. on the preferred and 6 per cent. on the common and leave a substantial surplus beside.

The chief interest in the prospectus, issued by H. W. Poor & Co., New York, who are the underwriters, lies in the letters which it contains from noted men in ship building circles. Rear Admiral Francis T. Bowles, chief constructor of the navy, who appraised the plants, says of the proposed consolidation:

REAR ADMIRAL BOWLES ON THE COMBINATION.

"With regard to the general prospects of this consolidation, it is easy to discern the advantages. The commercial success of ship building depends upon a thorough organization and co-ordination of all the various industries and trades, which together produce the completed ship ready to steam away carrying cargo and passengers or armor and guns, as the case may be, to maintain herself at sea as a great machine, and to provide a habitation for the officers and crew. Therefore, combination enables co-operation and presents these distinct advantages:

"First—Each concern builds that for which it is best fitted and equipped, or that which its character, location and labor can accomplish most economically.

"Second—Structural materials, steel, iron, timber, etc., can be purchased at the lowest rates, a prompt supply secured and sent to the points where it is most needed.

"Third—The technical knowledge of design, which comes from experience, records and data of each concern, will be combined, thus giving confidence to customers that the results they contract for shall be attained and reducing the ship builders' chances of failure to a minimum.

"Fourth—The healthy professional rivalry of the various yards can be utilized to produce the best results in design, construction and administration, without the disastrous and narrowing devices of destructive competition.

"Fifth—The standardization of the numberless details of ship fittings, auxiliaries and appliances, which are now almost as various and incongruous in design as they are in number, and their production in quantity by those best qualified, would produce enormous economies, and would especially result in a great reduction in the cost of government vessels. This matter not only affects first cost, but the cost of maintenance and repairs.

"Sixth—It will be possible to effect great economies by the separation of warships and merchant construction into different establishments, thus avoiding the difficulties of organization and increased cost of carrying out radically different types of construction upon adjoining ships.

"Seventh—The better organization and management of the individual concerns would be a necessary and direct result of this incorporation, and would be essential to its success. All deadwood would disappear, necessary positions only would be maintained, and general expense would be largely reduced."

Mr. Lewis Nixon in discussing the advantages of combined operation says: "The coal and iron deposits of the United States are such that this country is now the chief producer of the raw material required in ship building. But with the good will of the ship building trade already established in other countries and receiving the active support of their governments, special effort must be made if we are to reap the benefits of our exceptional advantages, even though in the long run this country by the logic of natural events is to be the ship building country of the world. If we are to enter the markets of the world as a serious and determined competitor we must present a solid front and be able to carry out work upon any scale, and by the completeness of our organization and equipment demand recognition. This can only be done by co-operation. American fighting tools have been called to the attention of the rest of the world and their superiority demonstrated by the test of war. There is certain, therefore, to be a demand for such material from foreign countries, and the value of such a trade can best be understood by a glance at the stupendous aggregations of machinery and capital represented by Krupp, Armstrong, Schneider and numerous others, are full to overflowing with many contracts for the very types of ships that met defeat at Manila and Santiago. The building of superior ships in America is in the hands of a few ship builders, and if these men merge their capital, energy, skill and initiative into one industrial organization, it will, from the start, combine actual productive experience, knowledge of costs and military judgment, which cannot be matched elsewhere in the world. Every other country has bent its energies to building up a great civil plant capable of producing war materials.

"It follows that if a great American plant shall be created composed of an aggregate of effective units of financial stability, combined with engineering and military management of unquestioned standing, which challenges comparison with similar institutions abroad by the refinement of its product, it will assuredly receive the active support of our government and this will carry with it a vast business in foreign orders, as the military equipment adopted by the United States will henceforth

be eagerly sought by other countries. We are now building vessels of war for Japan and Russia. But the military field, while vast, is insignificant when compared with that of the mercantile fleets of the world. New tonnage is being launched with all rapidity and yet the demand outstrips the supply. American ship builders in entering the foreign field must be able to utilize to the utmost every advantage, and to do this they must not compete with one another in the foreign trade, as there are enough competitors already fighting for the work and we do not want to surrender any of the advantages which are naturally ours.

"The question of supplying the home market and the United States navy will adjust itself, as the consolidation of the plants and ship building talent will enable the parent company to do all work, naval and marine, upon the basis of a fair manufacturer's profit above the actual cost. The limit of cost placed by congress upon ships will do away with any unjust insinuation that this is a combination to put up prices for government work. Every far-seeing statesman for the last twenty years has prayed for the upbuilding of our merchant marine and earnest efforts are being made to rehabilitate it. The United States Ship Building Co. proposes to supplement such efforts and make possible such upbuilding by bringing about a co-operation of enough ship building plants to render possible economies in purchase of material, organization and policy that will enable the company to take advantage of exceptional facilities and conditions and to enter at once into the enjoyment of the proceeds of an industry that is to become distinctively American and which in this age of steel will reflect the lesson of sixty years ago, when cheaper wood made us the leading ship building and ship owning nation of the world. Assuming all the co-operating yards to be full of work, each engaged upon vessels best suited to their capabilities up to its maximum capacity and by the duplication of plans and specifications, by standardizing the structural and mechanical parts of ships, their engines and fittings, the following work could be efficiently handled: Fifteen vessels of 15,000 tons each, fourteen vessels of 5,000 tons each, thirty vessels of 2,500 tons each, and ten vessels of 1,000 tons each, or a total tonnage of 380,000 could be undertaken at once and carried through to completion in eighteen months. This would require the services of about 24,000 men and there would be used about 275,000 tons of hull steel in their construction."

A GREAT FUTURE PREDICTED FOR THE PACIFIC.

Mr. Henry T. Scott of the Union Iron Works says: "So far as the ship building industry in America is concerned it is in its infancy everywhere; it has only just begun; heretofore capitalists have not been attracted to it; therefore, the men in the business have had to proceed slowly, increasing their plants as they obtained the money out of the business, and in no place does this condition of affairs exist more strongly than on the Pacific coast. We have here little or no modern steam power or sailing vessels, and while we have a few ships of iron, the majority are of wood. A great number of the latter would have been replaced during the last year had it not been for the fact that it was impossible to obtain material. There are not enough steamers or vessels to handle the business of this coast and all the large carrying trade is done in English bottoms. The completion of the military highway from Halifax to Vancouver and from St. Petersburg to Vladivostock, the rapid settling of British Columbia and the North Pacific states, and the districts of Amoor and Manchuria, all depending upon us for their cereals, etc., changes the world's front and transfer to the Pacific; the activities and interests that for centuries have made the Atlantic the scene of marine operations. These conditions, due to the opening of China and the far east, and the occupation of Hawaii and the Philippine islands by the United States, make the overshadowing event of the coming century the engineering and the industrial task of supplying their wants."

Mr. E. W. Hyde of the Bath Iron Works says: "The output of the American ship yards for the present fiscal year will be larger than any year for nearly half a century. Forty-five years ago the American ship yards were building nearly as many merchant vessels and of a tonnage almost as great as that of Great Britain. During the four years preceding the civil war the product of the American ship yards represented a greater carrying capacity in tons than that of the rival ship yards of England. There is no good reason why the American ship yards should not now construct a greater tonnage than Great Britain. American ship yards are already constructing ships for European and Asiatic nations, and there is no good reason why a large amount of the ship building trade from the Clyde and the Thames should not be brought to the yards of this consolidated company, which will possess such enormous advantages over any other company in the world. The great saving in the purchase of manufactured products and raw material for use in the combined concerns, and by the judicious distribution of orders to the various plants most convenient for the delivery of the vessels ordered, the common enjoyment of patent processes and machinery, the saving of a large number of high-priced duplicate officials, agents and their salaries, traveling expenses, the unprofitable underbidding and unreasonable competition of the various concerns, the establishment of a central bureau of finance, together with purchasing, engineering and labor departments, and the great advantage incident to the purchase of large quantities of manufactured materials and preferential deliveries provided for, and the consequent cheapening of transportation charges, the convenience and certainty of all supplies being received when required and of the quality desired, the greater facility with which proper labor can be supplied at the various plants when necessary at one and not at another, and the standardization of the great number of hull and engine details with their manufacture in quantity, considering all of which it will be found that the general and economic conditions will be so improved that the earning power of these concerns with their present capacity will be so largely increased that a new era of prosperity will be opened for them under the proposed co-operation."

OUTLINES A WONDERFUL PROGRAM.

The facilities, advantages and purposes of the company are strikingly set forth by the corporation as follows:

"The United States Ship Building Co., by its combined facilities, will be prepared to meet the increasing demand for ships of larger dimensions and greater speed, necessitated by the notable change in transatlantic requirements, and for war vessels of greater power, not only for our own government, but also for other governments not having the facilities to build all of their own ships in their own countries. This company will stand ready to take all work offered by this government upon a basis of actual cost, with a reasonable ship builder's profit added, thus providing exceptional facilities for the national defense under economic conditions more favorable to our government than those heretofore possessed by this or any other nation. It is the purpose and expectation of this company to make its profits largely out of economies resulting from the operation of the various plants under a centralized management and the increased output resulting therefrom, so that the American ship owners can procure larger and better ocean-going steamships than have been, until recently, produced in American yards, without increased cost per ton, thus offering every encouragement to the enlargement of the American merchant marine. As contracts for building large ocean-going steamships and naval vessels are only made with governments or companies of established financial standing, the business is an exceptionally safe one and practically free from bad debts.

"The superior machinery and plant in these yards are modern and up to present date requirements for turning out the largest and most powerful commercial vessels and ships of war. In addition, other properties have accumulated in the course of years of practical work, in the form of patterns, drawings, tools, fittings, etc., which are of priceless value and cannot be estimated too highly in connection with such business. This class of property cannot be procured for any amount of money for the use of newly-established yards. The combined possession by this company of all these valuable assets prevents the possibility of successful duplication of these properties by others for years to come. By the proper assignment of work to the yards where it can be best and most speedily done, by the duplication of plans and specifications, by standardizing the structural and mechanical parts of ships, their engines and fittings, this corporation can lay down, at one time, in its ship yards, at least twelve battleships or first-class cruisers, thirteen cruisers and twenty-one torpedo boats or destroyers, or forty-six fighting ships.

"It is no exaggeration to say that this corporation could undertake to duplicate or double the present fighting force of the United States navy, which has required sixteen years for its production, in the comparatively brief period of four years, and at an expense far less than the aggregate cost of the present vessels. If the emergency required hurried work, this time could be appreciably reduced. The plants acquired by this company comprise the most capable and efficient ship building establishments of the Atlantic and Pacific coasts for building, equipping and repairing ocean vessels. Among the most efficient vessels of all types in the United States navy are found those built in the above yards, such as the Kearsarge, Kentucky, Oregon, Olympia, San Francisco, Monterey, Annapolis, Farragut, Holland, Castine, Newport and Dahlgren. The superior facilities in the matter of repairs of vessels can be appreciated from the fact that the company possesses the only private dock on the Atlantic coast capable of docking vessels of the largest size. As the economical cargo carrier is the vessel of large dimensions this will bring a great volume of repair work to this company."

AROUND THE GREAT LAKES.

It is reported from Lorain that improvements contemplated in the works of the American Ship Building Co. at that point include a large boiler shop.

S. R. Chamberlain & Co. of Chicago have chartered for the present season the steamer Joseph L. Hurd. She will be placed in the lumber trade and will be sailed by Capt. Henry Wanvig.

One of Mr. D. R. Hanna's new steamers, the Geo. A. Flagg, delivered at Black Rock, near Buffalo, Wednesday, from the Lake Superior copper region, 2,900 tons of copper ore, valued at about $800,000.

Kennebec is the name selected for the steel steamer of Canadian canal dimensions—about 3,000 tons capacity—building at the works of the Jenks Ship Building Co., Port Huron, for Chesbrough Bros.

On her first trip down the lakes, Duluth to Buffalo, the new steamer J. T. Hutchinson of Cleveland is moving a cargo of 175,000 bushels of wheat. She left Duluth drawing 17 ft. 2 in. forward and 18 ft. 1 in. aft.

The Craig Ship Building Co., Toledo, will launch the passenger steamer Lakeside, building for the Sandusky & Island Steamboat Co., in a few days. The vessel will ply between Sandusky and the Lake Erie islands.

W. H. Williams of South Haven, Mich., head of the Williams Transportation Co., died of pneumonia in Baltimore on Saturday last. Mr. Williams was in Baltimore for the purpose of arranging for the transfer to the lakes of the steamer Faston, which his company purchased for service between Chicago and South Haven.

At the West Bay City yard of the American Ship Building Co. on Wednesday the last of eight steel steamers built during the past winter for J. C. Gilchrist was launched. The vessel is named Gilchrist. She will go to the Detroit works for her machinery. Two other Gilchrist steamers are being finished at the Detroit works. Five are in commission. Unless some new orders are soon booked by the big ship building organization the West Bay City yard will probably be closed.

NEW FUELING CO. AT CHICAGO.

The South Pier Coal Co. has been incorporated under the laws of Illinois with $25,000 capital to do a fueling business at Chicago. S. R. Chamberlain, vessel and insurance agent, No. 6 Sherman street, is president; Arthur Helm, with Wiley M. Egan, is vice president; Geo. Harris, agent of the Canada Atlantic line, secretary and treasurer, and Capt. Geo. Tebo, well known to the lake vessel owners and masters, is general manager of the company. The middle slip of the Illinois Central Railroad Co., opening into the basin just south of the mouth of the river, has been secured for a dock and the three-masted schooner Norman has been purchased, her sticks removed and a steam crane of eight tons capacity mounted amidships. The Norman can carry 420 tons in buckets and will be one of the best fuel lighters on the Chicago river. The company will make a specialty of Carterville coal, but will also handle the eastern coals when customers prefer. A number of vessel owners are stockholders, and the new company has a large part of its capacity already contracted for for the coming season. It thus starts out with every assurance of making its first year a financial success.

WITH THE COAST SHIP BUILDERS.

Arthur Sewall & Co., Bath, Me., have closed a contract with the Standard Oil Co. for the construction of a four-masted steel sailing ship. The work of stretching the keel will take place on May 25, immediately after the launching of the four-masted steel ship Acme for the same company. The dimensions of the new craft are: Length, 332 ft.; beam, 45 ft.; depth, 26 ft. There are to be two full decks, between decks as well as poop and forecastle, the poop extending 44 ft. in length. The deck houses of the new ship will include forward house, 44 by 18 ft., accommodating the donkey boiler, engineer's berth, galley, cook's room and forecastle, the midship house including the mess room, four state rooms for petty officers, carpenter's shop and sail room, and aft a commodious cabin. A stairway on the starboard side of the cabin will lead to a chart house on the deck above. Aft of the chart house will be a steel house 12 by 15 ft. for the man at the wheel.

While the new dry dock of the Newport News Co. has not been formally dedicated as yet, it has been placed in commission. The Chesapeake & Ohio steamer Louise and the Plant line steamers Miami and Olivette floated into the mammoth basin on Saturday last. The Miami is the steamship which is coming to the great lakes to go upon the Mackinaw and Duluth route of the Northern Steamship Co. The Louise is 173 ft. in length, the Miami 239.2 ft. and the Olivette 274.3 ft., and yet the great basin had room for still another small vessel.

Information from Philadelphia is to the effect that the New York Ship Building Co., Camden, N. J., has begun work upon four steel, twin screw passenger and freight steamers for the Atlantic Transport Co. In the ship building edition of the Review attention was called to this contract. The vessels are doubtless similar to the two which are now being constructed at the yard of the Maryland Steel Co., Sparrow's Point, Md., for the same company. They are to trade from Philadelphia, New York and Baltimore to London in the passenger and freight business.

The Harlan & Hollingsworth Co., Wilmington, Del., has contracted to build a double-decked screw ferry boat for the Riverside & Fort Lee Ferry Co. of New York, of the following dimensions: Length over all, 180 ft.; beam, molded, 38 ft.; beam, over guards, 60 ft.; depth, molded, 15 ft. 6 in. The motive power will consist of a three-cylinder compound engine supplied with steam by two Scotch boilers.

It is understood that the Union Iron Works, San Francisco, has entered into a contract for the construction of the largest refrigerator ocean steamer on the Pacific. She is for the Pacific Cold Storage Co. of Tacoma, Wash., and is intended to ply between Tacoma and Alaska in summer and to Honolulu and Manila in winter.

A four-masted barge, the Cardenas, built for the Staples Coal Co., Taunton, Mass., by Kelley, Spear & Co., Bath, Me., was launched at Bath, Me., recently. Work upon other barges at these yards for the Staples Coal Co. is well advanced, and another one, to be called Sagua, will be launched in a few weeks.

Lewis Nixon has purchased additional water frontage adjoining his yard at Elizabethport, N. J., so that he now has about 600 ft. depth water frontage.

The torpedo boat destroyers Truxton, Whipple and Worden will be launched at the yard of the Maryland Steel Co. Sparrow's Point, Md., on May 30.

James & Tarr of Essex have contracted to build a new fishing schooner for Capt. Joshua W. Stanley and others of Gloucester, Mass.

Percy & Small, Bath, Me., have a big wooden five-master ready for ceiling and are stretching the keel for another in their own yard.

The New England Co., Bath, Me., has contracted to build a four-masted schooner for Capt. A. J. Huston of Baltimore, Md.

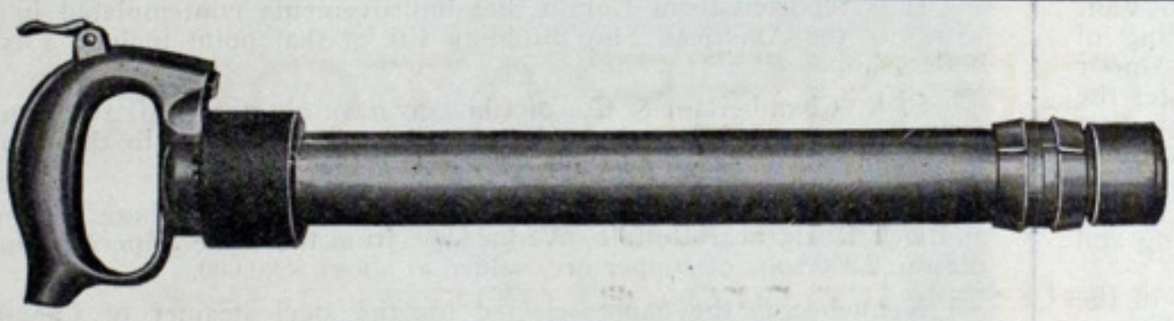
The Morgan liner El Dia will be launched at the yard of the Newport News Co., Newport News, Va., on Saturday.

It is understood that Mr. Leonard B. McKenzie will establish a ship yard at Gloucester, Mass.

CHANGE OF TRAINS ON THE B. & O. R. R.

On and after Sunday, May 19, the through Chicago sleeper will leave Cleveland daily at 6:30 p. m., instead of 9:35 p. m., arriving Chicago 6:50 following morning. On same date a new train will be placed in service, leaving Cleveland daily at 11:20 p. m., arriving at Pittsburg 6:40 a. m., Washington 4:50 p. m., Baltimore 5:53 p. m., Philadelphia 8:15 p. m. and New York 10:40 p. m., with sleeper to Pittsburg and observation parlor and chair cars beyond, giving daylight ride through the historic mountain scenery. The afternoon train with through sleeper to Washington and Baltimore will leave Cleveland daily at 3:00 p. m., instead of 3:10 p. m. May 23

For the first time in the history of the United States the weekly production of pig iron has passed the 300,000 ton mark, and yet during the past month the stocks of coke and anthracite iron in the hands of the merchant furnaces showed a further decline. The weekly capacity of the furnaces in blast on May 1 was 301,125 tons, compared with 296,676 tons on April 1, 250,351 tons on Jan. 1, and 215,301 tons on Nov. 1 last. Referring to this increase in production the Iron Age says: "How enormous the quantity of material is which is being worked up is illustrated also by the fact that the United States Steel Corporation during April produced close upon 800,000 tons of steel ingots, this, of course, including Bessemer and open hearth steel. When it is taken into consideration that a number of plants, large and small, controlled by outside companies, are running full and that even then there is a scarcity of steel, some conception may be formed of the stupendous consumption, thus again confirming the evidence of the blast furnace returns. It has never been approached in the history of this country. Besides this, the fact should be noted that the tonnage taken for some time past for export has been very small."



Some Pneumatic Tool Talk.

Don't be fooled by any "just as good as **'Little Giant'** " talk—that's the tribute other makers unwittingly pay to **"Little Giant"** superiority. "Just as good" means taking chances—larger repair bills, smaller profits. If the other fellow's "just as good" was really just as good he'd say it was better. You know that.

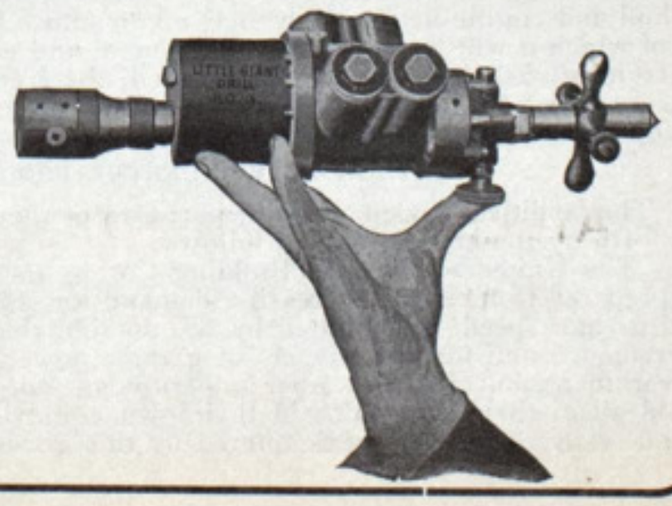
Now, there's our Long Stroke Hammer; where is there anything to compare with it? It's the latest and best Long Stroke Hammer on the footstool. It has no vibration, and it does the biggest day's work in a day without making the operator feel at night as though he'd been hanging on to the tail end of a full grown cyclone for ten hours. It drives rivets perfectly up to 1 in. It has only three moving parts. No other Hammer has so few.

If you want a smaller Hammer for chipping, calking, beading, etc., one of our seven sizes will fill the bill. You know all our Hammers have a regulator that lets in the air just as it's wanted and every one of them cushions on exhaust air, saving fully 30 per cent. over hammers that cushion on live air.

They're simple, too, and have no delicate parts.

Then, there are Pneumatic Drills. We make the only Piston Air Drills having a double-balanced Piston Valve cutting off at 5/8 of full stroke, and these Drills can be operated in a bath of oil, because the exhaust doesn't come in contact with the working parts. They're made entirely of steel, are economical in the use of air, and they stand the racket. **"Little Giant"** tools have met with the pleased appreciation of good mechanics all over the world, and have, through sheer merit, become the standard for comparison in representative shops of all sorts where pneumatic tools are used.

We send any "Little Giant" Tool anywhere for a free 30 days' trial.
We guarantee every "Little Giant" Tool for one year.



STANDARD PNEUMATIC TOOL COMPANY,

Manufacturers of Pneumatic Drills, Hammers,
Reversible Flue Rolling, Reaming, Tapping and Boring Machines,
and all kinds of Air Tools and Appliances.

Ask for Catalog "E"
It's free.

Main Offices, 1541-1550 Marquette Bldg., Chicago, Ill.
New York Office, 141 Broadway.

DESIGN FOR A FAST DISPATCH VESSEL.

The Review lately published a paper upon the subject, "Design for a Fast Scout," by Vice Admiral Fitzgerald, which was read before the Institution of Naval Architects in London. The paper has attracted great attention throughout England and Rear Admiral S. Eardley Wilmot has replied to it as follows:

"Vice Admiral Fitzgerald's general idea was that first-class cruisers are too valuable to be exposed to the danger of watching an enemy's port; that the smaller cruisers would, from want of speed, be liable to capture by faster and more powerful vessels of the enemy; while transatlantic liners are too large for such service, and therefore a special type must be created. This he proposed to be a vessel of 3,800 tons, having a sea speed of 23 knots, with power on an emergency to work up to 25 knots. To attain this on such moderate dimensions, it is necessary to sacrifice offensive and defensive qualities, so the armament is limited to a few 4 in. guns, and the protection to a steel deck of no great thickness. With a normal coal supply of 500 tons, she was to have capacity to carry more than double this amount, but at a sacrifice of speed when so loaded. The discussion that followed exhibited considerable difference of opinion. Commander Clover, United States naval attache, bore testimony to the value of the transatlantic liner for scouting, as demonstrated by the St. Paul and St. Louis in the war with Spain. Admiral Sir John Hopkins pointed out how such a vessel as Admiral Fitzgerald suggested could be utilized in the Mediterranean in the event of war, while Capt. H. J. May emphasized the disadvantages of a vessel whose functions were so limited. Employed as a scout she would have to run from a hostile squadron's outlying cruisers, and, the speaker assumed, return to her own fleet without having seen the enemy's main fleet. This, however, was not the method employed of old, for if chased, our frigates returned when they had shaken off the pursuer and clung tenaciously to the foe until they had acquired sufficient information of his strength and probable route to take back to their admiral.

"The question whether a scout should be able to fight as well as to acquire information has given rise to further discussion without leading to any definite conclusion. I think the conflicting opinions quoted have resulted from confusing the scout with the dispatch vessel. Their functions are different. Take squadron scouting in the old wars, it was usually performed by frigates, swift, handy vessels, able to keep the sea for long periods. We have an illustration of their use in the account of Nelson's chase after Villeneuve in the West Indies. He had two frigates, and they pushed on ahead to gain information both going and returning. But when Nelson felt convinced that Villeneuve was homeward bound, he dispatched, not a frigate, but a brig to England with the news. That vessel, the Curieux, sighted the French fleet, and, hastening to England, gave the news which led to Sir Robert Calder's action. Nelson could not spare a frigate for such service. After the Nile also he sent a duplicate of his dispatches by the brig Mutine to Naples, whence Capel, her commander, brought them overland to England. Collingwood, after Trafalgar, sent his dispatches home, announcing the victory, by the Pickle, schooner. Comment has been made on his employing such an insignificant craft to convey such important information, but all his frigates were busily employed looking after disabled vessels and prizes. Thus we see there are times when an admiral has need of a vessel for such services, and one whose absence would not materially diminish the scouting and fighting qualities of his squadron. Had Admiral Fitzgerald entitled his paper 'Design for a Fast Dispatch Vessel' he would not only have obviated much criticism, but could have demonstrated his vessel to be the lineal descendant of a famous pair, now a quarter of a century old. It was doubtless for comparatively short runs at high speed that the Iris and Mercury were constructed and designated special dispatch vessels. The ordinary cruiser having then only a speed of 15 knots, their higher rate of 18 knots was no less marked than it is in Admiral Fitzgerald's proposed craft. Curiously enough, his design has a still closer relation to the Iris and Mercury. They are of 3,750 tons; he proposed the limit of 3,800, thus in each case is demonstrated the difficulty of associating speed and endurance with small dimensions. Though exceedingly successful vessels, the Iris and Mercury were not repeated, for in the Arethusa class, which followed them, a reduction of 2 knots in speed was deliberately accepted, and the special function of dispatch became merged in the general utility of a cruiser. In fact, practical naval experience clearly teaches that the fewer special vessels a fleet comprises the better.

"Scouting duties, however, demand different qualifications, chief of which is sustained speed in all conditions of weather, and experience has demonstrated that this is not to be obtained by a vessel of 3,800 tons. Length and weight at once tell when a vessel with good steam power has to be pushed against a head wind and sea. Thus, in 1885, when the Oregon, a liner of 7,350 tons, was attached to the particular service squadron, which had no other cruiser exceeding 4,000 tons, her value for scouting purposes was soon proved, simply because our fleet then lacked efficient cruisers. In 1889 a class of vessels was begun which, on a displacement of 7,500 tons, combined speed and endurance with an armament much more powerful than that carried by the Oregon. The first-class cruisers of the St. George type could execute the functions of scouting, and not be easily driven off by any hostile vessel, while they could no less efficiently protect our commerce. Though now ten years old, they are still admirable vessels, on which we do not seem to have greatly advanced in later designs. Yet it is to such a type we must look for an efficient scout, and not to some special craft unsuitable for general service. Nor is it necessary to go to the abnormal dimensions of a Powerful to obtain the qualities required, for in the French cruiser Guichen, of 8,300 tons, and a speed of 23 knots, our neighbors have a vessel that an admiral would always find useful as a scout. All naval construction is in these days more or less based on theory; but we shall be wise to avoid assuming that in time of war vessels can be limited to certain special services, and scouting is but one of many duties which will then fall to the lot of our cruiser fleet."

BELLEVILLE GENERATORS

Grand Prix 1889 — Hors Concours 1900
Originated 1849 — Latest Improvements 1896

Number of Nautical Miles made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

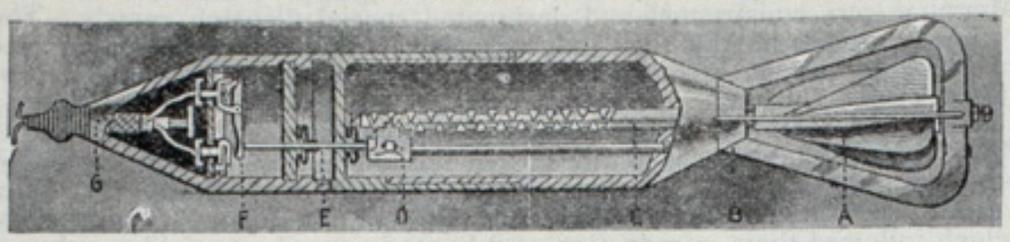
Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890	67,728	2,460										
1891	68,247	68,331	204									
1892	68,247	68,403	69,822	23,259								
1893	68,379	68,343	68,286	68,247								
1894	68,439	68,367	68,574	68,439	37,701							
1895	68,673	68,766	68,739	68,808	40,887	28,713						
1896	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE AT ST. DENIS (SEINE), FRANCE.
TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT-DENIS-SUR-SEINE.

McGRAY ELECTRIC LOG.

The McGray Electric log, spoken of in these columns some time ago, has reached a degree of perfection that is attracting attention from sources best suited to judge of the value of a device of this kind. It is manufactured by the Ship & Seamen's Safety Co., A. N. McGray, president, No. 25 Equitable building, Boston.

One of these logs will be found at the Pan-American Exposition and a test will soon be made on one of the large steamers of the great lakes. At the request of the United States navy department a log of this kind was towed across the Atlantic and back by the American line steamer St. Louis. The results were very satisfactory indeed, the log recording within 2.9 knots of the same distance in both directions. This showing on a 6,100-knot run is remarkable. It has certainly never been approached by any other instrument. Capt. Passow of the St. Louis was pleased to grant a splendid testimonial of this performance, and one of the ships of the American line will be equipped with a McGray log immediately. One of the vessels of the British navy was fitted with one of these logs five months ago and it is giving splendid satisfaction.



Much of the class work of the naval architecture department of the Massachusetts Institute of Technology has been conducted at sea with this log, and by its use a large amount of heretofore unobtainable data has been secured. That this log enables more exact data being secured in efficiency tests of marine engines and boilers is acknowledged, and the scientific department of all first-class ship yards in the world will be quick to avail of its use in progressive speed runs and all other expert tests.

AN ELECTRICAL SOUNDING MACHINE.

The Ship & Seamen's Safety Co. of Boston, proprietors of the McGray electric log, will shortly put on the market an electrical sounding machine. The recording device will be located in the wheelhouse of the ship, while soundings are being taken at full speed, or up to 16 knots. Every fathom that the lead descends in the water is registered in the wheelhouse, under the eye of the navigator. In addition to the recording operation, as soon as the lead strikes bottom an electric bell is sounded, to attract the attention of the navigator, who is able to tell at any moment just where the lead is and what the officer in charge is doing with it. This instrument will cost $150 to $160, which is much less than the price charged for the Sir Wm. Thompson device, and it is said to have numerous advantages over the latter. With the Thompson instrument the lead must be hauled on board and word sent to the bridge before the depth is known, while with this new sounder the exact depth is known in the wheelhouse the instant the cast is made. If the lead does not reach bottom, then the recorder shows how far down it did go and the navigator knows whether it got bottom at the recorded distance by the ringing of the bell. In case the lead does not get bottom the bell does not ring, but the depth to which it descended is recorded.

TRADE NOTES.

A letter from the Gas Engine & Power Co. and Chas. L. Seabury & Co., consolidated, announces the removal of their down-town office in New York from 50 Broadway to 11 Broadway, Bowling Green building.

A folder issued by the Boston Cork Works, 52 Purchase street, Boston, shows a great variety of specialties which they make for vessels, notably canvas goods for yachts. The list includes ring buoys, canvas buckets, gilt balls and brass swivels, keg and canvas moving buoys, diamond fenders of special shapes, side fenders, etc.

The Seaboard Steel Casting Co., Chester, Pa., has awarded a contract for the construction of a large pattern storage warehouse adjoining its plant. The new building, which is made necessary by the company's growing business, will be 60 by 130 ft. and will be built of brick, two stories high. The company is also constructing a pier 325 ft. long for unloading sand and shipping castings.

The Joseph Dixon Crucible Co., Jersey City, N. J., has placed upon the market a graphite brush which they recommend to the electrical trade. The company has used the brushes upon its own motors and generators during the past three years and it is from their experience with them that they feel confident in offering them to the trade. The company is sending out price lists indexed under the names of makes of motors, showing sizes and prices of brushes.

IMPORTANT NOTICE.

On and after Sunday, May 19, trains of the B. & O. R. R. will depart from Cleveland as follows:

For Akron, Canton, Valley Junction	7:15 a. m. daily
Akron, Canton, Marietta	11:00 a. m. ex. Sun.
Akron, Washington, New York	3:00 p. m. daily
Akron, Canton, Valley Junction	3:25 p. m. daily
Akron, Canton, Chicago	6:30 p. m. daily
Akron, Canton, Pittsburg, Phila., New York	11:20 p. m. daily

Note changes present schedule. May 23

The compound marine engines, both fore and aft and vertical tandem, as built by Marine Iron Works, station A, Chicago, have met with considerable favor on the Atlantic and Gulf of Mexico coasts, that company having built eighteen sets of them for those waters so far this year. 4

BOILER FOR SALE.

Marine Fire Box, allowed 116 lbs. Size 8 ft. by 13½ ft. Good condition. Address Hardy & Dischinger, Toledo, Ohio.

BURNISHINE.

THE MOST MARVELOUS METAL POLISH IN THE WORLD.

In Liquid and Paste Form.

Will Polish Hot or Cold Metal, no matter which.

Produces a wonderfully brilliant lustre on brass, copper, nickel and all metals, no labor required.

Used on steamers all over the world. Free samples on application.

J. C. PAUL & CO.
57 Dearborn St., CHICAGO, ILL.

Engineers

in every section of the world should interest themselves by

Getting in touch with us.

We know that we can be of service to you if you will write us your wants as regards PACKINGS for your valve rods, pistons, etc. We are the manufacturers of

Garlock's HIGH-GRADE Packings

for every purpose, and can assure you they are the best, being made of superior material, and are of the finest workmanship. Let us know your requirements and we absolutely guarantee to supply your wants. Address our nearest office and you will receive our prompt, careful and best attention.

Send for catalogue and samples to our nearest office.

THE GARLOCK PACKING CO.

NONE GENUINE

WITHOUT IT.

New York. Boston. Chicago. Philadelphia. Pittsburg. Cleveland. St. Louis. Denver. San Francisco.

MAIN OFFICES AND FACTORIES:
PALMYRA, N. Y.; ROME, GA.

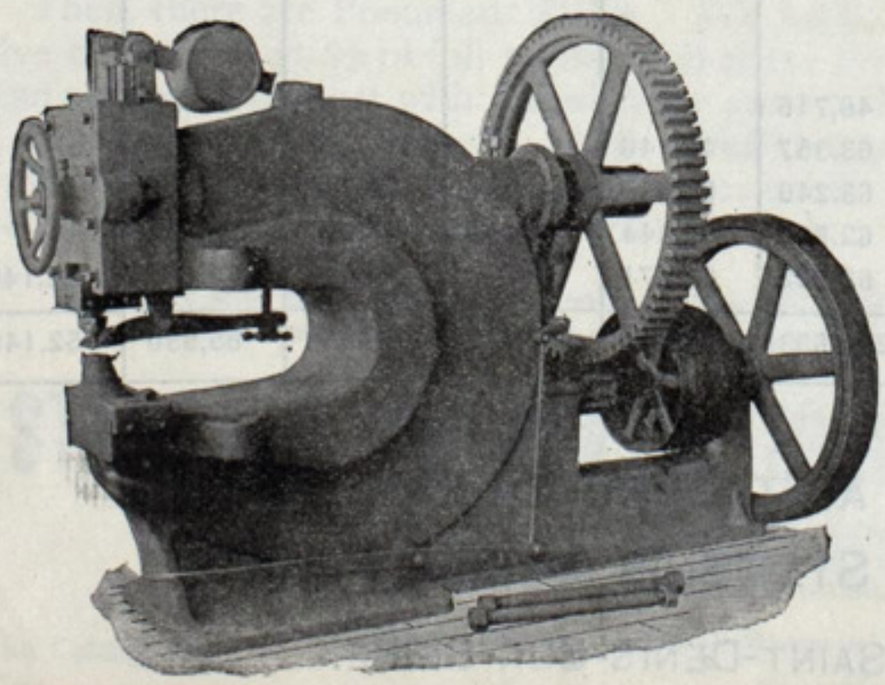
"BENEDICT-NICKEL" SEAMLESS TUBING
FOR CONDENSER TUBES

Contains NO ZINC nor any weakening metal.
Send for Booklet with treatise on "Electrolysis of Condenser Tubes."

Benedict & Burnham Mfg. Co., *Mills and Offices,* Waterbury Conn.
New York, 253 Bd'wy. Boston, 172 High St.

THIS ILLUSTRATES OUR

Standard Boiler Maker's Punch



which is similar to our iron worker's punch with the exception that it is equipped with a plain jaw instead of an architectural jaw. We believe that this is the best punch for boiler makers on the market to-day, and for strength, reliability, and beauty of design we think it is unequaled. We can refer you to hundreds of the largest shops all over the world where we have installed one or more of these tools, and where they are giving the best of satisfaction and service.

Let us hear from you if you are in the market for a tool of this kind. We think we can interest you both as regards quality and price.

THE CLEVELAND PUNCH SHEAR WORKS CO.,
CLEVELAND, O., U. S. A.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST STOCKLESS ANCHOR.
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON ORDER, OR STOCK ORDERS PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO 80,000 POUNDS WEIGHT.
MACHINE WORK AND PATTERNS FURNISHED WHEN REQUIRED.
RAIL OR WATER DELIVERIES.
CAPACITY, 1500 TONS PER MONTH

Seaboard Steel Casting Co.,

CHESTER, PA.

Treasury Department, Office of General Superintendent U. S. Life-Saving Service, Washington, D. C., May 4, 1901. Sealed proposals will be received at this office until 2 o'clock p. m. of Friday, the 31st day of May, 1901, and then publicly opened, for furnishing supplies required for use of the Life-Saving Service for the fiscal year ending June 30, 1902; the supplies to be delivered at such points in New York City, Grand Haven, Mich., and San Francisco, Cal., as may be required, and in the quantities named in the specifications. The supplies needed consist of Beds and Bedding; Blocks and Sheaves; Cordage; Crockery; Furniture; Hardware; Lamps, Lanterns, etc.; Lumber; Medicines, etc.; Paints, Oils, etc.; Ship Chandlery; Stoves, etc.; Tools, and Miscellaneous Articles; all of which are enumerated in the specifications attached to the form of bid, etc., which may be obtained upon application to this office, or to the Inspector of Life-Saving Stations, 17 State Street, New York City; Superintendent Twelfth Life-Saving District, Grand Haven, Mich.; and Superintendent Thirteenth Life-Saving District, New Appraisers' Stores, San Francisco, Cal. Envelopes containing proposals should be addressed to the "General Superintendent U. S. Life-Saving Service, Washington, D. C.," and marked on the outside "Proposal for Annual Supplies." The right is reserved to reject any or all bids, and to waive defects, if deemed for the interest of the Government. S. I. Kimball, General Superintendent.

May 16

U. S. Engineer Office, Cincinnati, O., April 27, 1901. Sealed proposals for building 500 feet length of Chanoine dam of navigable pass at Dam No. 4, Ohio River, will be received here until 2 p. m., June 4, 1901, and then publicly opened. Information furnished on application to Wm. Martin, Resident Engineer, Davis Island Dam, Bellevue, Pa., or to this office. Wm. H. Bixby, Maj., Engrs. May 23.

U. S. Engineer Office, Jones Building, Detroit, Mich., May 6, 1901. Sealed proposals for dredging, and other work required for removing obstructions to navigation in main Ship Channel between head of St. Clair and mouth of Detroit rivers, will be received here until 12 noon (Standard time), May 28, 1901, and then publicly opened. Information furnished on application. G. J. Lydecker, Lt. Col., Engrs. May 23.

FOR SALE.

BALANCED COMPOUND MARINE ENGINES carried in stock for immediate delivery—20 to 200 horse power. Full line of patterns for larger sizes and quadruple expansion engines, insuring quick delivery. Highest economy and speed.

NO VIBRATION. Contracts taken for complete plants.

July 25. **WELLS ENGINEERING CO., 136 Liberty St., NEW YORK, N. Y.**

FOR SALE OR CHARTER.

First-class British steamers, of Welland canal dimensions; about 3,250 gross tons capacity, carrying about 2,000 gross tons on 14 ft. (fresh water) draught. Speed 10 knots loaded; easy consumption. Large hatchways. For further particulars address "Charter," The Marine Review Pub. Co., Perry-Payne Bldg., Cleveland, Ohio. May 30.

One cent a mile to the Pan-American Exposition at Buffalo via the Nickel Plate road on May 15 and 29. Train leaves Bellevue, O., at 12:15 midnight, leaving Cleveland at 2:06 a. m., and arriving at Buffalo at 7:35 a. m. Tickets are good returning within three days on any one of our peerless express trains where scheduled to stop. For rates and time of train at intermediate stations see bill, call on nearest agent or address C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 49, May 29.

STANDARD SEAMLESS TUBE CO.

MANUFACTURERS OF

Seamless Cold Drawn Steel Tubing

IN ALL SIZES FROM 1/8 TO 16" DIAMETER.

Stay Tubes,
Water Grates,
Compressed Air and High Steam Pressures.

Boiler Tubes
FOR ALL CLASSES OF MARINE WORK.

Hollow Shafts,
Bushings,
Hydraulic Tubes,
Etc., Etc.

NATIONAL TUBE COMPANY,

SELLING AGENTS,

SALES OFFICES:

Havemeyer Building, New York.
Conestoga Building, Pittsburg.
Western Union Building, Chicago.
95 Milk St., Boston.
267 So. Fourth St., Philadelphia.
420 California St., San Francisco.

FOREIGN OFFICE:
Dock House, Billiter Street,
London, E. C., Eng.

Dearborn Vegetable Boiler Compounds.

SCIENTIFICALLY AND UNIFORMLY MADE. EVER RELIABLE.

Most Scientifically equipped, Complete, Handsome and expensively Furnished Laboratories, and the ONLY EXCLUSIVE LABORATORIES ON STEAM ECONOMY in the Country.

MARINE FORMULA NO. 5, For the WATERS of the FIVE LAKES.

To prevent pitting, neutralize the oil, stop incrustation, and as a perfect preservative to the iron, boiler, and all its connections—especially prepared for the marine trade of the lakes.

If you are using a different water, prepay the express on a gallon jug of your feed water to the DEARBORN LABORATORIES at CHICAGO and receive a copy of analysis of same, with a written diagnosis of your case, and a letter giving you all the valuable information we can, and the actual cost of what it will require to clean your boilers and keep them clean. All of this will be done free of charge, and optional with you whether you order or not. When in Chicago call and inspect our Laboratories.

Analyzers of Everything.

WM. H. EDGAR, President.

Makers of Boiler Compounds. DEARBORN DRUG & CHEMICAL WORKS Manufacturing and Analytical Chemists.

CHICAGO

OFFICES: 29, 30, 31, 32 and 33 Rialto Building. Telephone, Harrison, 1373. WORKS: 23, 25, 27 and 29 La Salle Street. Telephone No. 1130 South.

CRAIG SHIP BUILDING CO.

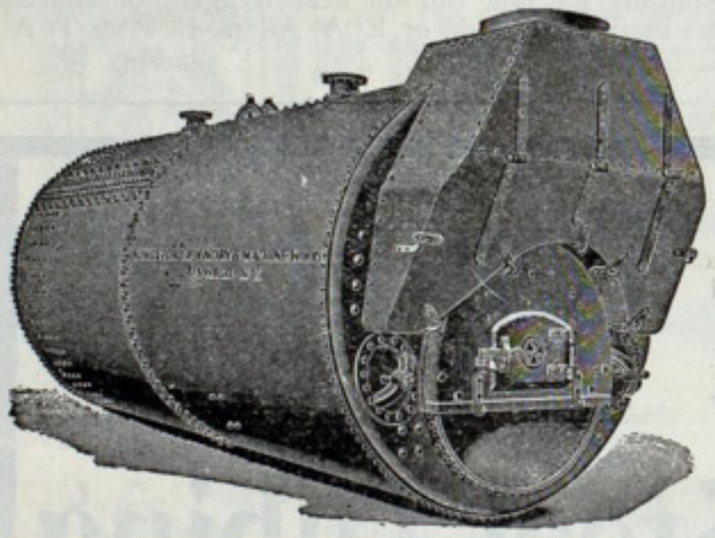
TOLEDO, OHIO,

METAL AND WOODEN SHIP BUILDERS.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships

A SPECIALTY.

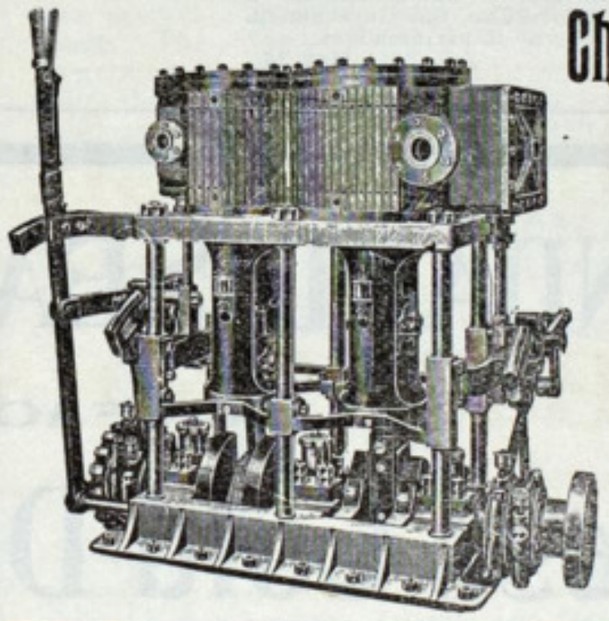


Marine Boilers.

Centrifugal Pumping Machinery for all Purposes.

Kingsford Foundry and Machine Works,

OSWEGO, N. Y.



Chas. P. Willard & Co.

F. C. WALTER, Manager.

45-49 S. Canal St., CHICAGO.

BUILDERS OF

Marine Engines and Boilers,
Paddle Wheel Engines,
Boat Machinery,
High Pressure, Compound and Triple Expansion Engines,
Yachts and Launches.

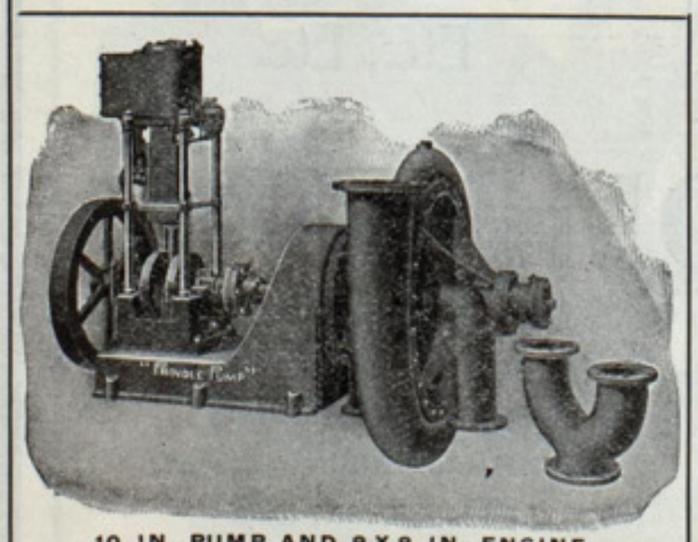
WRITE FOR CATALOGUE.

R. D. WOOD & CO., 400 CHESTNUT ST., PHILADELPHIA.

CENTRIFUGAL PUMPS

DIRECT-CONNECTED TO

STEAM ENGINE OR ELECTRIC MOTOR.

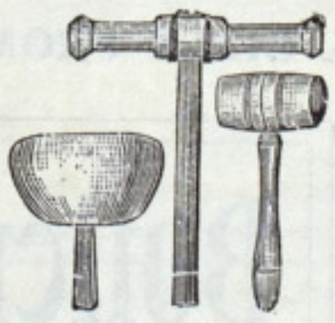


10 IN. PUMP AND 8X8 IN. ENGINE.

UNEQUALLED FOR

MARINE SERVICE.

Circulating Water for Condensers,
Bilge Water Drainage,
Dry Dock Service,
Dredging, Wrecking, &c.



WE ARE THE INVENTORS OF THE

CAULKING MALLETS

NOW USED IN ALL THE SHIP YARDS OF THE WORLD.

Specialties: Boiler Makers' Mauls, Stone Cutters' Mallets, Hawsing Beetles, and all kinds of Mallets.

Illustrated Catalogue and Price List upon application.

N. Y. MALLET & HANDLE WORKS,

Established 1845.

454 E. Houston Street, NEW YORK, U. S. A.

BARGAINS IN BOOKS.

AS LEADERS IN OUR BOOK TRADE WE WILL ALLOW FOR A SHORT PERIOD A DISCOUNT OF 25 PER CENT ON THE FOLLOWING BOOKS. LISTED ON PAGE 35 OF THIS ISSUE OF THE REVIEW:

A Library of Steam Engineering—Fehrenbatch.
Gas and Oil Engines—Richmond.
Slide Valves—MacCord, Jr.
A Handbook of Engineering Practice—Smart.
Modern Examinations of Steam Engineers—Wakeman.
Theoretical and Practical Ammonia Refrigeration—Redwood.
Elementary Naval Tactics—Bainbridge-Hoff.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

MARINE VALVE MINERAL SEAL | DARK LUBRICATING, ELDORADO ENGINE | RENOWN ENGINE, HEAD LIGHT | VICTOR SIGNAL, CRANK CASE. LARD OILS

AND

ARCTIC CUP GREASES

MARINE VALVE OIL FOR INTERNAL LUBRICATION.

CARRIED IN STOCK BY THE

STANDARD OIL COMPANY,

5 WABASH AVENUE, CHICAGO, and 123 RIVER STREET, CLEVELAND.

RENOWN ENGINE OIL FOR EXTERNAL LUBRICATION

ALSO FOR SALE BY

STANDARD OIL COMPANY,

Muskegon, Mich. Racine, Wis. Milwaukee, Wis. Sheboygan, Wis. Manistee, Mich. Manitowoc, Wis. Green Bay, Wis. Buffalo, N. Y. Ludington, Mich. West Bay City, Mich. Detroit, Mich. Escanaba, Mich. St. Ignace, Mich. Ashland, Wis. Kenosha, Wis. Marinette, Wis. Oshkosh, Wis. Duluth, Minn. West Superior, Wis. Hancock, Mich. Marquette, Mich. Sault Ste. Marie, Mich. Saginaw, Mich.

ATLANTIC REFINING CO., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. McKINNON, Ashtabula Harbor, O.
HENRY HULL, Lorain, O.
LAKE ERIE SUPPLY CO., Conneaut, O
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut, O.
CHAPMAN & HILLS, Lorain, O.
HARBOR SUPPLY CO., Ashtabula, O.
SCOTT BROS., & DeLISLE, Marine City, Mich.
MARINE SUPPLY CO., Fairport, O.
THE M. I. WILCOX CO., Toledo, O.
SO. CHICAGO SHIP CHANDLERY CO., So. Chicago.

A Complete Plant for Steel Ship Building

IS OFFERED FOR RENT by the Estate of Hugh Ramsay, Perth Amboy, N. J.

Includes well-equipped Machine and Blacksmith Shops, Plate and Angle Shops and Mould Loft.

WITHIN TWENTY-FIVE MILES OF NEW YORK CITY AND WITHIN THE LIMITS OF AN EXCELLENT HARBOR.

Forty feet of water at low tide in front of the yard.

Address P. O. Box 23, Perth Amboy, N. J.

Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for Channel and Harbor Lighting; over 1000 gas buoys and gas beacons in service.

Burn Continuously from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

Brilliant and Steady Illumination.

Economical and Reliable in Operation.

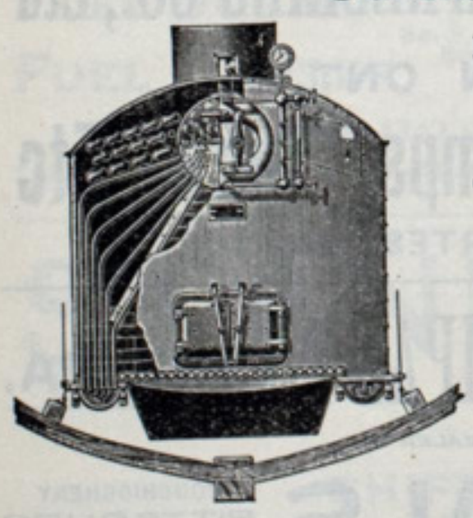
Controlled by the SAFETY CAR HEATING AND LIGHTING CO.,

160 Broadway, New York City.

SEABURY'S

Safety Water Tube Boiler

For all types of Steam Vessels and Stationary Plants.



Reliable, Safe, Durable, Compact, Light Weight, Economical, Easily Managed.

Tubes may be readily cleaned, internally or externally.

Marine Engines,

STEAM and SAIL YACHTS,

THE ONLY NAPHTHA LAUNCH.

Gas Engine & Power Co. and Charles L. Seabury & Co. Consolidated.

MORRIS HEIGHTS, NEW YORK CITY.

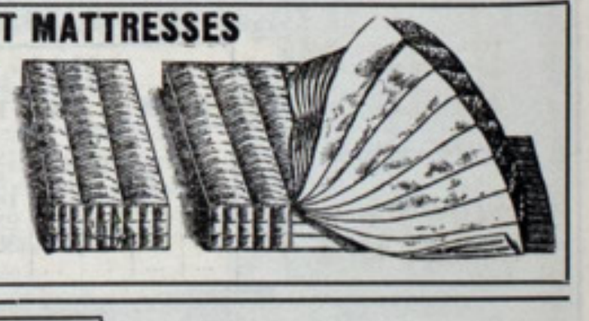
FOGG'S RESILIENT FELT MATTRESSES AND CUSHIONS

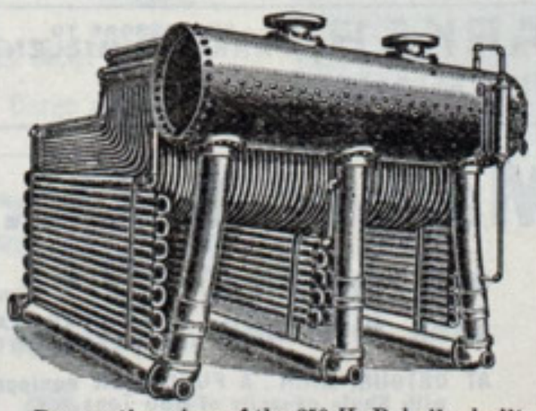
MANUFACTURED BY

M. W. FOGG,

20 Fulton St., NEW YORK.

Send for Illustrated Catalogue.





Perspective view of the 250 H. P. boiler built for steamboat Clara, having 6 feet face and 8 feet length; 37 1/2 square feet of grate area and 1900 square feet heating surface. Weight of boiler and water, 14,000 lbs.

WE CLAIM for the Boyer Sectional Water Tube Boilers, that they are of an entirely new design, are simplest in construction, are accessible to all parts, are rapid steamers with short circulation, have low center of gravity, have no joints in the fire, have no dead ends, occupy less space in width, length and height than any other, are easily fired, can be repaired or set up by any ordinary mechanic, do not require a brick casing, and are shipped whole or knocked down into packages for transportation by man or beast.

The Boyer Water Tube Boiler Co.,

90 Wall Street, NEW YORK.

MENTION THIS PAPER.)

GEORGE STRATFORD OAKUM CO.,

MANUFACTURERS OF

Oakum, Plumbers' Spun and Marine Oakum and Spun Cotton.

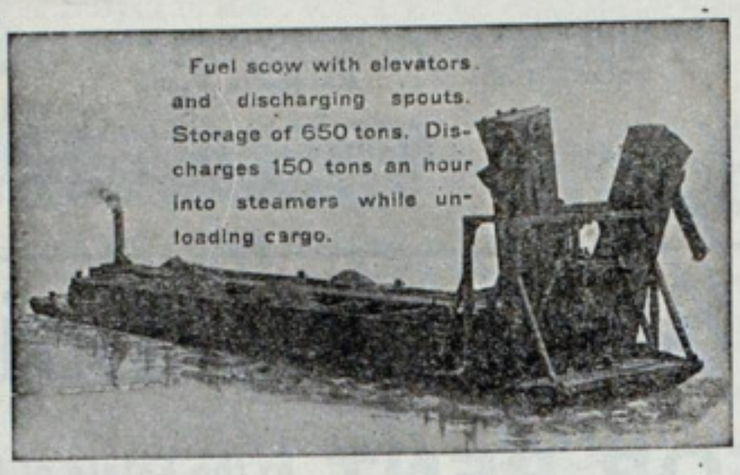
OFFICE AND FACTORY:

CORNELISON AVENUE, JERSEY CITY, N. J.

Steamboat Fuel at Ashtabula. LARGE SUPPLIES OF BEST QUALITY.

Lighter

Carrying Different Grades at all Times.



M. A. HANNA & CO., Miners and Shippers. Main Office, Perry-Payne Bldg., Cleveland

A. A. & B. W. PARKER, SUCCESSORS TO PARKER & MILLEN, DETROIT, MICH.

Pickands, Mather & Co.,

FUEL LIGHTERS AT BUFFALO, ERIE, ASHTABULA AND CLEVELAND.

AT DETOUR, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.

Best Quality PITTSBURGH COAL furnished at any time during Day or Night.

Western Reserve Building, CLEVELAND, O.

Sterling, Welch & Co.

IMPORTERS, WHOLESALE AND RETAIL DEALERS IN

Carpets, Curtains and Upholstery Goods

OF EVERY DESCRIPTION.

An extensive assortment of the Newest and Choicest Styles of the best foreign and home manufacture, and for sale at the lowest market prices.

SPECIAL CONTRACTS MADE IN FURNISHING Boats, Yachts, Etc.

An inspection of our establishment and stock is earnestly solicited.

12 and 14 Euclid Avenue, CLEVELAND, O.

The Williams & Rodgers Company,

Superior and Seneca Sts., CLEVELAND, O.

WE MAKE A SPECIALTY OF FITTING OUT BOATS

Carpets, Rugs, Furniture, Curtains, Bedding,

AND ALL OTHER FURNISHINGS USED IN CABINS.

SPECIAL RATES TO THE MARINE TRADE.

Bring your Boat wants and your family wants to this store, and we'll take the very best care of you. Dry Goods, Housefurnishings, Carpets, Furniture, and all other articles found in a first-class Dry Goods House.

THE WILLIAMS & RODGERS COMPANY,

CLEVELAND, O.

The Erie & Western Transportation Co. ANCHOR LINE. 1901.

Passenger Service—					
Steamers.....	India,		China,	Japan.	
Ports of call...	Buffalo, Detroit, Erie,	Sault Ste. Marie, Mackinac Island,	Hancock, Port Huron,	Marquette, Duluth,	Cleveland, Houghton.
Freight Service—					
Steamers.....	Alaska, Schuylkill,	Delaware, Lycoming, Conemaugh,	Codorus, Conestoga, Juniata,	Mahoning, Clarion, Lehigh,	Susquehanna, Wissahickon.
Ports of call...	Buffalo, Detroit, Houghton,	Erie, W. Superior, Sault Ste. Marie,	Cleveland, Hancock, Chicago,	Marquette, Duluth, Milwaukee.	

CHAS. E. MARKHAN, Gen. Pass. Agt., Buffalo, N. Y.

E. T. EVANS, Western Manager, Buffalo, N. Y.

THE DONNELLY SALVAGE AND WRECKING CO., Ltd

JOHN DONNELLY, SR., Pres.
JOHN DONNELLY, JR., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

KINGSTON ONT.

Divers, Steam Pumps, Tugs, Etc

SUPPLIED ON SHORTEST NOTICE.

The W. L. SCOTT COMPANY, ERIE, PA.

WHOLESALE DEALER IN

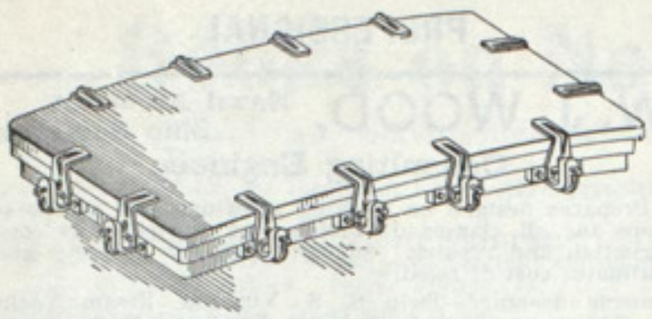
SHAMOKIN ANTHRACITE WILKESBARRE

COALS

YOUGHIOGHENY PITTSBURG MANSFIELD

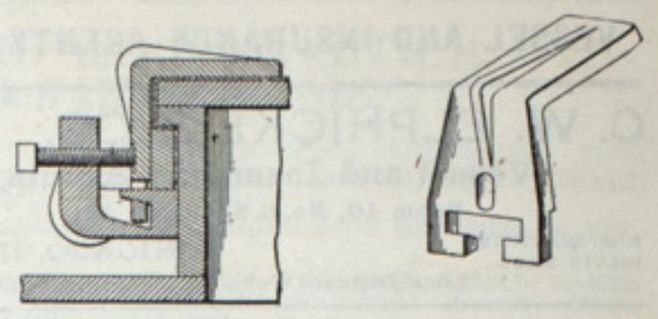
VESSEL FUELING A SPECIALTY By STEAM LIGHTER or Car Dump at all hours. Electric Light.

Main Office, Scott Block, Long Distance Telephone No. 440.
Fueling Office, Canal Dock, Long Distance Telephone No. 320.



A Successful Hatch Fastener.

Costs Less than appliances now in use.
May be applied to any vessel by an ordinary workman.



Not only holds down the hatch cover, but at the same time battens the tarpaulin so securely as to insure the cargo against damage of any kind. May be applied equally well to wood or steel vessels and made in sizes to suit any hatch. Parts are all of malleable iron ; no danger of breakage ; not affected by heat or cold.

CAPT. M. MULHOLLAND, PATENTEE,
Wade Building, CLEVELAND, OHIO.

CASTNER, CURRAN & BULLITT,

SOLE AGENTS FOR

POCAHONTAS SMOKELESS SEMI-BITUMINOUS COAL

THE BEST STEAM COAL IN THE WORLD.

Officially endorsed by Great Britain and United States. Standard Fuel of United States Navy.
Used exclusively on Cunard, White Star and other Transatlantic Lines.

Main Office, 328 Chestnut Street - - PHILADELPHIA PA.

BRANCH OFFICES:

1 Broadway, New York.
Citizens Bank Building, Norfolk, Va.
Calle Reconquista 399, Buenos Ayres, Argentine Republic, South America.
Old Colony Building, Chicago, Ills.
70 Kilby Street, Boston, Mass.
Terry Building, Roanoke, Virginia.
Neave Building, Cincinnati, Ohio.
4 Fenchurch Avenue, London, England.

PITTSBURG COAL CO.

Steamboat Fueling Facilities at various points on the Great Lakes:

Cleveland Harbor { 4 Car Dumpers. 3 Lighters.	Fairport Harbor { 1 Car Dumper. 1 Lighter.	Ashtabula Harbor { 1 Car Dumper. 1 Lighter.	Erie Harbor { 1 Car Dumper. Fuel Pockets.

Detroit River Branch { Docks and Pockets at Sandwich and Amherstburg.	Sault River Branches { Dock and Pockets at Detour. Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)

WE FURNISH ONLY THE BEST GRADE OF PITTSBURG and YOUGHIOGHENY COAL.

General Office, Lake Department, Perry-Payne Building, Cleveland, O.

STEAMBOAT FUEL AT CHICAGO.

THE Y&L

Youghiogheny and Lehigh Coal Co.

J. T. CONNERY, Manager. ARCHIE J. HITCHCOCK, Dock Sup't.

FUEL DOCKS: No. 1, Michigan Slip and Basin. 'Phone 3046, Main.
No. 2, N. Halsted St. Bridge. 'Phone 773 North.

FUEL LIGHTER: Equipped with 125 2-ton Buckets for Fueling Anywhere in Harbor.

MAIN OFFICE: 1238-1242 Chicago Stock Exchange Building.
Long Distance Telephone, Main 5049. 110 LA SALLE STREET.

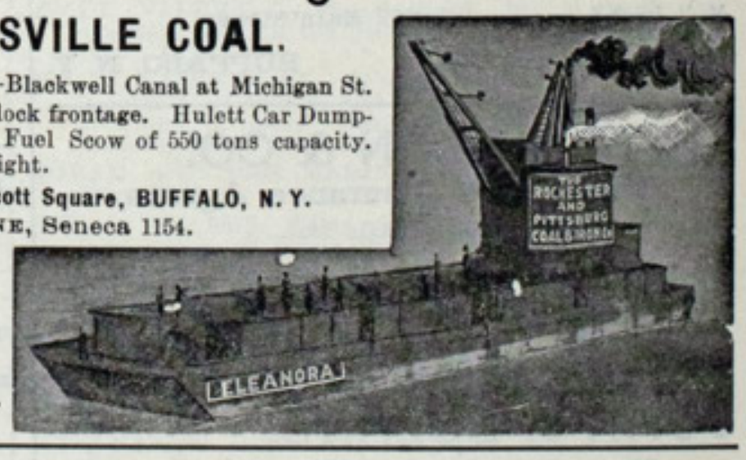
The Rochester & Pittsburgh Coal & Iron Co.

REYNOLDSVILLE COAL.

STEAMBOAT FUEL DOCK—Blackwell Canal at Michigan St. Bridge. 1400 feet of dock frontage. Hulett Car Dumping Machine. Steam Fuel Scow of 550 tons capacity. Boats coaled day or night.

OFFICE: 684-88 Ellicott Square, BUFFALO, N. Y.
TELEPHONE, Seneca 1154.

E. McQ. DUTHIE,
Cargo and Fuel Agent.



STANLEY B. SMITH & CO.

DETROIT, MICH.

SHIPPERS OF **COAL** BY RAIL AND LAKE

OPERATING

SMITH'S COAL DOCK, Detroit River.

VESSEL AND INSURANCE AGENTS.

C. W. ELPHICKE & CO.
Vessel and Insurance Agents,
Room 10, No. 6 Sherman St.,
C. W. ELPHICKE.
CALVIN KARR.
CHICAGO, ILL.
Long Distance Telephone, Harrison 1194.

MITCHELL & CO.
JOHN MITCHELL.
JOHN F. WEDOW.
ALFRED MITCHELL.
Vessel and Insurance Agents,
508, 509 & 510 Perry-Payne Bldg.
Office Telephone M 767.
Residence, John Mitchell, Doan 341. CLEVELAND, O.
John F. Wedow, Doan 141 J. Alfred Mitchell, Doan 218.

F. H. OSBORN & CO.
Marine Insurance Brokers,
12 Sherman Street,
Long Distance Telephone, Harrison 1586. CHICAGO.

D. T. HELM & CO.
Vessel Agents,
TRANSPORTATION. Board of Trade,
MARINE INSURANCE. DULUTH, MINN.

W. C. RICHARDSON,
Vessel and Marine Insurance Agent,
420-421 Perry-Payne Building,
Office Telephone 338.
Residence Telephone 2938. CLEVELAND, O.

D. SULLIVAN & CO.
D. SULLIVAN.
F. J. SULLIVAN
VESSEL AGENTS.
MARINE INSURANCE.
2 & 4 Sherman Street, CHICAGO, ILL.
Tel. Harrison 2847.

J. G. KEITH & CO.
Vessel and Insurance Agents,
138-139 Rialto Building,
Long Distance Telephone, Harrison, 1339. CHICAGO.

HALL & ROOT,
JOHN B. HALL.
HARRY B. ROOT.
Vessel Agents,
21-22 Exchange Building, 202 Main St.,
Telephone Seneca 892. BUFFALO, N. Y.

DRAKE & MAYTHAM,
Vessel Agents,
M. M. DRAKE.
G. W. MAYTHAM.
202 Main Street,
Telephone Seneca 1660. BUFFALO, N. Y.

HUTCHINSON & CO.
Vessel and Insurance Agents,
Office Telephone, Main 2453.
Residence C. L. Hutchinson, W. 697L.
Residence W. H. McGean, E. 198J.
313-315 Perry-Payne Bldg.,
C. L. HUTCHINSON.
W. H. M'GEAN, CLEVELAND, O.

JOHN J. BOLAND,
Vessel and Insurance Agent,
25-26 Exchange Bldg., 202 Main St.,
Telephone Seneca 115. BUFFALO, N. Y

Nautical Encyclopedia
BY HOWARD PATTERSON.
Most complete work of its kind ever issued.
In press. Price $3.00. Published by the Marine Review Pub. Co., Cleveland, O.

VESSEL AND INSURANCE AGENTS.

SAMUEL HOLMES,
Steamship Offices, Morris Building,
For Selling, Chartering and Building all classes Steam Vessels. 66-68 Broad St.,
Steam Vessel Circulars.
Weekly Freight Circulars. NEW YORK.

THOS. WILSON, Managing Owner
WILSON'S TRANSIT LINE,
General Forwarder.
Freight and Vessel Agent. CLEVELAND, O

BROWN & CO.
J. J. H. BROWN.
J. B. RODGERS.
EDWARD SMITH.
Vessel and Insurance Agents,
202 Main Street,
BUFFALO, N. Y.

PROCTORS IN ADMIRALTY.

RAY G. MacDONALD,
Attorney at Law and Proctor in Admiralty,
Suite 618 New York Life Building,
Telephone Central 723. CHICAGO, ILL.

STOWE & GRAYDON,
Lawyers and Proctors in Admiralty,
WILLIAM E. STOWE.
THOMAS J. GRAYDON. 204 Dearborn Street,
Suite 806 Marquette Building.
Telephone Central 1225. CHICAGO.

HOYT, DUSTIN & KELLEY,
Lawyers and Proctors in Admiralty,
Offices, 702 Western Reserve Building,
CLEVELAND, O.

White, Johnson, McCaslin & Cannon,
ATTORNEYS AT LAW and PROCTORS IN ADMIRALTY,
Williamson Building, CLEVELAND, O.

GOULDER, HOLDING & MASTEN,
LAW OFFICES,
HARVEY D. GOULDER.
S. H. HOLDING.
FRANK S. MASTEN. Perry-Payne Building,
CLEVELAND, O.

ALBERT J. GILCHRIST,
PROCTOR IN ADMIRALTY,
604 Perry-Payne Building,
CLEVELAND, O.

ORESTES C. PINNEY,
Lawyer and Proctor in Admiralty,
Rooms 316 and 317 Perry-Payne Building,
Telephone Main 2585. CLEVELAND, O.

"Elements of Navigation" (Henderson)
Just the book for beginners—mates, wheelmen and watchmen. Recommended because it is short, simple and yet comprehensive.
Price $1.
THE MARINE REVIEW PUB. CO., CLEVELAND.

PROFESSIONAL.

W. J. WOOD, Naval Architect, Ship Surveyor.
Consulting Engineer.
Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs.
Vessels designed—Twin S. S. Virginia, Steam Yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.
COMPLETE PLANS FURNISHED FOR STEEL COMPOSITE OR WOODEN VESSELS
Office on Goodrich Dock, foot of Michigan Avenue, CHICAGO, ILL.

Pittsburgh Testing Laboratory, Ltd.,
INSPECTING AND METALLURGICAL ENGINEERS AND CHEMISTS,
1750 Monadnock, CHICAGO. 325 Water Street, PITTSBURGH.
906-7 Crozier Building, Philadelphia.
New York City, 60 New Street.
Richmond, Va., 1107½ Main Street.
Inspectors of Shipbuilding Materials and Machinery. Inspectors located at all mills, Physical and Chemical Laboratories. Tests of all kinds.

ROBERT W. HUNT & CO.
Bureau of Inspection, Tests and Consultation.
1121 The Rookery, Chicago.
Monong. Bank Bldg., Pittsburgh.
71 Broadway, New York.
Inspectors of Shipbuilding Material and Machinery. Inspectors of all Materials. Duty Tests of Engines and Boilers. Physical and Chemical Laboratories.

HORACE SEE,
CONSULTING ENGINEER AND NAVAL ARCHITECT,
No. 1 Broadway, NEW YORK

AMBROSE V. POWELL, M. Am. Soc. C. E.
CIVIL ENGINEER,
Designs and Constructs Dry Docks, Harbor Works, Docks and Plant for Handling Coal and Ore, Foundations.
Office, 1008 Chamber of Commerce, CHICAGO, ILL.

PATENTS.

THURSTON & BATES,
Counselors at Law in Patent Causes and Solicitors of Patents,
1028 Society for Savings Bldg.,
E. L. THURSTON.
ALBERT H. BATES. CLEVELAND, O.

HERBERT WRIGHT & CO.,
1011-1015
THE WILLIAMSON BUILDING,
CLEVELAND, O.
TELEPHONE, MAIN 2754.
Every possible facility for conducting a brokerage business in
STOCKS, BONDS, GRAIN, ETC.

Compass Adjuster
CAPT. J. M. FIELDS.
Inventor of Fields' Course Finder,
BETHEL HOTEL. CLEVELAND, O.

Books on Naval Architecture, SHIP YARD PRACTICE, SEAMANSHIP, Etc.

AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. $2.25.

AZIMUTH TABLES for the Great Lakes—Hydrographic Office. 50 cents.

BOILER MAKERS AND IRON SHIP BUILDERS' COMPANION. Comprising a series of original and carefully calculated tables. James Foden. $2.

BOWDITCH'S USEFUL TABLES. $1.25.

CONSTRUCTION AND MAINTENANCE OF VESSELS BUILT OF STEEL—Thos. Walton. In preparation.

DATA BOOK—Naval architects and engineer's data book. By T. H. Watson. A reliable and simple means of recording valuable data, etc., of vessels and engines. Size of book, 8¾ in. by 5 in., cloth, $2.

ELEMENTARY NAVAL TACTICS—Com. Wm. Bainbridge-Hoff, U. S. N. $2.

ELEMENTARY SEAMANSHIP—D. Wilson Barker. $2.

ELEMENTS OF NAVIGATION—Henderson. $1.

GEORGIAN BAY AND NORTH CHANNEL PILOT—Department of Marine and Fisheries, Canada.

GEORGIAN BAY AND NORTH CHANNEL SAILING DIRECTIONS—Hydrographic Office. 40 cents.

HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Ginsburg. $1.75.

ILLUSTRATED NAUTICAL ENCYCLOPEDIA—Howard Patterson. In press. $3.

ILLUSTRATIVE CLOUD FORMS FOR THE GUIDANCE OF OBSERVERS IN THE CLASSIFICATION OF CLOUDS—Hydrographic Office. $1.00.

INTERNATIONAL SIGNAL CODE—Bureau of Navigation. $2.50.

KNOW YOUR OWN SHIP—Thos. Walton. $2.50.

LAKE SUPERIOR AND ST. MARY'S RIVER SAILING DIRECTIONS—Hydrographic Office. 30 cents.

LATITUDE AND LONGITUDE: How to Find Them—W. J. Millar. $1.

MANUAL OF ALGEBRA—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises. $1.50.

MARINER'S COMPASS IN AN IRON SHIP: How to keep it efficient and use it intelligently. J. W. Dixon. $1.

MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations. $1.25.

MODERN PRACTICE OF SHIP BUILDING IN IRON AND STEEL. Samuel J. P. Thearle. 2 volumes. Second edition, revised and enlarged. $5.25.

NAVAL ARCHITECTURE: A treatise on laying off and building wood, iron and composite ships. Samuel J. P. Thearle. In two volumes. $3.

NAVAL ARCHITECTURE: A manual on laying off iron and steel vessels—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards. $5.

NAVAL ARCHITECTURE—Sir W. H. White. New Edition. 750 pages. $9.

NAVAL ARCHITECTURE—J. J. Welch. New edition. Out soon.

NAVAL ARCHITECTS AND SHIPBUILDER'S POCKET BOOK—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Seventh edition. 700 pages; pocket-book form. $5.

NAVAL POCKETBOOK—Clowe. $2. Containing valuable information concerning all navies of the world.

NAVIGATION AND NAUTICAL ASTRONOMY—Prof. J. H. C. Coffin. $3.50.

NAVIGATION: THEORETICAL AND PRACTICAL—D. Wilson Barker. Illustrated. $1.50.

OCEAN METEOROLOGY: For vessels of the Merchant Navy—William Allingham. $2.

THE PILOT: A guide to United States Local Inspectors' examinations of Masters and Mates. R. M. Pugsley. $1.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. $3.

PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships—J. T. Towson. $2.

PRACTICAL MARINE SURVEYING—Harry Phelps. $2.50.

PRACTICAL MECHANICS, Applied to the Requirements of the Sailor—Thos. Mackenzie. $1.50.

PRACTICAL NAVAL ARCHITECTURE—S. J. P. Thearle. Two vols., $3.

PRACTICAL SEAMANSHIP FOR USE IN THE MERCHANT SERVICE: Including all ordinary subjects; also Steam Seamanship, Wreck Lifting, Avoiding Collision, Wire Splicing, Displacement, and everything necessary to be known by seamen of the present day. Second edition, illustrated. John Todd and W. B. Whall. $8.40.

PROJECTION TABLES—Bureau of Navigation. $1.50.

RESISTANCE AND PROPULSION OF SHIPS—Durand. $5.

RESISTANCE AND PROPULSION OF SHIPS—By Taylor. $3.75.

SAILING DIRECTIONS FOR THE GREAT LAKES AND CONNECTING WATERS. Second edition. Hydrographic Office. 30 cents.

SCOTT'S COAST PILOT FOR THE GREAT LAKES. $1.50.

SCREW PROPELLERS AND MARINE PROPULSION—I. McKim Chase. $2.50.

SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two volumes. $7.

SHIP BUILDING—Tables for constructing ship's lines. Second edition. Archibald Hogg. $2.

SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition, $2; a few copies of the first edition at $1.

STABILITY OF SHIPS—Sir E. J. Reed. $8.40.

STEAM YACHTS AND LAUNCHES—By Kuhnhardt. $3.

STEERING OF SHIPS AND YACHTS AND MANEUVERING THEM IN NARROW WATERS; having especial reference to the influence of the Screw Propeller on the steering of steamers. Sir C. Purcell Taylor. $1.25.

ST. LAWRENCE RIVER SAILING DIRECTIONS. Second edition. Hydrographic Office. 70 cents.

SUBMARINE BOATS—By Hovguard. $2.

TABLES FOR FINDING THE DISTANCE OF AN OBJECT BY TWO BEARINGS—Hydrographic Office, U. S. N. 30 cents.

TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce, U. S. N. Equipping and handling of vessels under sail or steam. $10.

THEORETICAL NAVAL ARCHITECTURE: A treatise on the calculations involved in naval design. Samuel J. P. Thearle. In two volumes. $3.50.

THEORETICAL NAVAL ARCHITECTURE—E. L. Attwood. Text book; 114 diagrams. $2.50.

TRIGONOMETRY FOR THE YOUNG SAILOR—R. C. Buck. $1.50.

"WRINKLES" IN PRACTICAL NAVIGATION. Ninth edition, revised. S. T. S. Lecky. $8.40.

Books on Marine Engineering, On the Operation of Engines and for Beginners in the Engine Room.

AIDS TO ENGINEERS' EXAMINATIONS, with Questions and Answers—N. Hawkins. $2.

ALGEBRA SELF-TAUGHT—W. P. Higgs. Fourth edition. 60 cents.

AMERICAN MARINE ENGINEER—By Edwards. $2.50.

ARITHMETIC OF THE STEAM ENGINE—E. S. Gould. $1.

BREAKDOWNS AT SEA AND HOW TO REPAIR THEM—A. R. Leask. 252 pages. $2.

BREAKDOWNS—Thos. Reed. $1.50.

CATECHISM OF THE MARINE STEAM ENGINE—Edwards. $2.

DATA BOOK—Valve setting record book, for the use of marine engineers, by P. A. Low. 60 cents.

DATA BOOK—The engineer's and draughtsman's data book, for workshop and office use. So arranged that the data of a complete set of engines, boilers, auxiliary engines, pumps, etc., for a steamship can be recorded on four pages. Enough space for 20 sets of engines. Bound in full limp leather. $1.25.

DATA BOOK—Marine engineer's record book—engines. By Bryan C. Bartley. Names of all parts, etc., are printed in one column on the left hand side of book when opened, and the remaining space is lined and column ruled for the recording of all necessary data. Complete thumb index which will facilitate ready reference. Contains enough space for 22 complete sets of engines. Size of book, 7¾x5¼ in., bound in full limp leather. $2.00.

DRAWING AND DESIGNING FOR MARINE ENGINEERS—Chas. W. Roberts. $3.

ELECTRIC LIGHTING FOR MARINE ENGINEERS, or how to light a ship by the electric light and how to keep the apparatus in order. S. F. Walker. $2.

ELECTRIC SHIP LIGHTING—A hand book on the practical fitting and running of ship's electrical plant. J. W. Urquhart. $3.

ELEMENTARY LESSONS IN STEAM MACHINERY—Langmaid and Galsford. For students and subordinates in marine engineering. $2.

ENGINEER'S MANUAL—By Ainsley. $5.

ENGINE ROOM PRACTICE—John Leveridge. $2.50.

ENGINES AND ENGINE RUNNING—Joshua Rose. For the use of those who desire to pass an examination to take charge of an engine or boiler; illustrated. $2.50.

EXAMINATION QUESTIONS AND ANSWERS—Emory Edwards. 900 examination questions and answers for young engineers and firemen who desire to obtain marine licenses. $1.50.

GAS AND OIL ENGINES—G. Richmond. A practical hand book on the care and management of gas engines, with instructions for running oil engines. $1.

HAND BOOK OF ENGINEERING PRACTICE—Richard A. Smart. $1.25.

HAWKINS' INDICATOR CATECHISM. $1.

HIGH SPEED STEAM ENGINES—W. Norris and Ben H. Morgan—With 115 Illustrations. $2.50.

HOW TO RUN ENGINES AND BOILERS. Practical instruction for young engineers and steam users. E. P. Watson. $1.

KEY TO ENGINEERING, WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY and ENGINEER'S EPITOME—Three excellent little books for marine engineers. 50 cents each, or three for $1.

KEY TO ENGINES AND ENGINE RUNNING—Joshua Rose. For use of those desiring to pass examination to take charge of an engine or boiler. $2.50.

LESSONS AND PRACTICAL NOTES ON STEAM, THE STEAM ENGINE, PROPELLERS, ETC.—King. $2.

LIBRARY OF STEAM ENGINEERING—John Fehrenbatch, M. E. $5.

MACHINISTS' AND DRAFTMEN'S HAND BOOK—Peder Lobben. A reference book for all interested in mechanical work. $2.50.

MARINE BOILER MANAGEMENT AND CONSTRUCTION—C. E. Stromeyer. $5.

MARINE BOILERS: A treatise on the Causes and Prevention of their Priming, with remarks on their general management. Reed. $2.

MARINE BOILERS—L. E. Bertin. 250 illustrations, designs and tables. $7.50.

MARINE BOILERS—Triplex. $1.

MARINE ENGINEERS—Constantine. Just out. $2.50.

MARINE ENGINES AND STEAM VESSELS—By Murray. $1.60.

MARINE ENGINES—R. Murray. $1.80.

MARINE PROPELLERS—By Barnaby. $4.25.

MARINE STEAM ENGINES—Sennett & Oram. $6.

MARINE STEAM ENGINES—Main and Brown. $5.

MECHANICS' AND ENGINEERS' POCKET BOOK, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. $4.

MECHANICAL ENGINEERS' POCKET BOOK—Wm. Kent. Reference book of rules, tables, etc. $5.

MECHANISM OF MEN-OF-WAR—R. C. Oldknow. A description of machinery to be found in modern fighting ships. Numerous illustrations. $3.

MODERN EXAMINATIONS OF STEAM ENGINEERS—W. H. Wakeman. $1.50.

MODERN AMERICAN MARINE ENGINES—By Edwards. $5.

MODERN MARINE ENGINEERING—By Burgh. $10.

NAUTICAL ENCYCLOPEDIA, ILLUSTRATED—Howard Patterson. Complete from Standpoint of Marine Engineer and Naval Architect. In press. $3.

NAVAL ENGINEER AND THE COMMAND OF THE SEA—F. G. Burton. $1.25.

NEW CATECHISM OF ELECTRICITY—N. Hawkins. $2.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Rounthwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. $3.

PRACTICAL ADVICE FOR MARINE ENGINEERS—C. W. Roberts. 64 illustrations. $1.

PROGRESS OF MARINE ENGINEERING—By Main. $1.50.

QUESTIONS AND ANSWERS, 188 Elementary, from Reed's Engineers' Hand Book. A valuable help to the young engineer working up for his license. $1.

QUESTIONS AND ANSWERS, sixth edition—Stephen Roper. $2.

REED'S ENGINEERS' HAND BOOK—New edition; illustrated by 345 diagrams and 36 large plates. $5. REED'S GUIDE. $5.

REED'S KEY to Reed's Hand Book—Contains working of all questions given in examination papers. $3.

RESISTANCE AND PROPULSION OF SHIPS—W. F. Durand, principal of school of marine construction, Cornell University. $5.

ROPER'S ENGINEERS' HANDY BOOK for Steam Engineers and Electricians. Revised and enlarged. $3.50.

SCREW PROPULSION—By Taylor. $3.75.

SLIDE VALVE, SIMPLY EXPLAINED—W. J. Tennant. $1.

SLIDE VALVES—C. W. MacCord, Jr. A book for practical men on the principles and methods of design. $1.50.

SMALL ENGINES AND BOILERS—Egbert P. Watson. A manual of concise and specific directions for construction of small steam engines and boilers of modern types; illustrated. $1.25.

STEAM AND THE MARINE STEAM ENGINE—Jno. Yeo. $2.50.

STEAM BOILERS: Their management and working on land and sea. James Peattie. $2.

STEAM BOILERS—Joshua Rose. Practical treatise on construction and examination. Seventy-three engravings. $2.50.

STEAM BOILERS—Peabody & Miller. $2.50.

STEAM ENGINES AND BOILERS—Frederick Colyer. $5.

STEAMSHIPS AND THEIR MACHINERY—By Haldane. $6.

TEXT BOOK ON MARINE ENGINEERING—Tompkins. $3.00.

THEORETICAL AND PRACTICAL AMMONIA REFRIGERATION—I. I. Redwood. $1.

THEORY OF STEAM ENGINE—Weisbach. $5.

TRIPLE AND QUADRUPLE EXPANSION ENGINES AND BOILERS AND THEIR MANAGEMENT—A. Ritchie Leask. Third edition, revised. $2.

USEFUL HINTS TO SEAGOING ENGINEERS, AND HOW TO REPAIR AND AVOID BREAKDOWNS. Second edition, revised and enlarged. Reed. $1.40.

WATER TUBE BOILERS—Fourth revised and enlarged edition of HOW TO RUN ENGINES AND BOILERS—E. P. Watson. Practical instruction for young engineers and steam users. $1.

The Marine Review Publishing Co.,

Sent to any address, carriage prepaid, at prices named. **PERRY-PAYNE BUILDING, CLEVELAND.**

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 418-419 Perry-Payne Bldg., Cleveland.

See accompanying Index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.
"Long Arm" System Co.....Cleveland.

AIR PUMPS AND APPLIANCES.
Gleason-Peters Air Pump Co.....New York.

ANCHORS.
Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.
Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.
American Blower Co.....Detroit.
American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
MacDonald, Ray G.....Chicago.
Pinney, Orestes C.....Cleveland.
Stowe & Graydon.....Chicago.
White, Johnson, McCaslin & Cannon.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.
Bliss, John & Co.....New York.
Goerz, C. P.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

BENDING AND STRAIGHTENING ROLLS.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.

BLOCKS, SHEAVES, ETC.
Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.
Coleman & Sons, Walter.....Providence, R. I.

BLOWERS.
American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

BOAT NAILS AND SPIKES.
American Steel & Wire Co.....Chicago.

BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.
Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer Water Tube Boiler Co.....New York.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Delaunay, Belleville & Co.....St. Denis, France.
Detroit Screw Works.....Detroit.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Gas Engine & Power Co.....Morris Heights, N. Y.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Building Co..Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roberts Safety Water Tube Boiler Co.....New York.
Stirling, The Co.....Chicago.
Trigg, Wm. R. Co.....Richmond, Va.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

BOILER COMPOUNDS.
Dearborn Drug & Chemical Works.....Chicago.

BOILER FURNACES, FIRE FRONTS, ETC.
Continental Iron Works.....New York.

BOILER RIVETS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BOLT CUTTERS.
Niles Tool Works Co.....Hamilton, O.

BORING AND TURNING MILLS.
Niles Tool Works Co.....Hamilton, O.

BRASS AND BRONZE CASTINGS.
Cramp, Wm. & Sons.....Philadelphia.
Illinois Smelting & Refining Works.....Chicago.
Phosphor Bronze Smelting Co.....Philadelphia.

BRIDGES, BUILDERS OF.
American Bridge Co.....New York.
Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.
Brown Hoisting & Conveying Machine Co.....Cleveland.
McMyler Mnfg. Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.
Martin-Barriss Co.....Cleveland.

CAPSTANS.
American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

CHAINS.
Monongahela Iron & Steel Co.....Pittsburg.
Newhall Chain Forge & Iron Co.....New York.
Standard Chain Co.....Pittsburg.

CHAIN HOISTS.
Boston & Lockport Block Co.....Boston, Mass.

CHUCKING MACHINES.
Niles Tool Works Co.....Hamilton, O.

CHUCKS FOR LATHES, DRILLS AND PLANERS.
Skinner Chuck Co.....New Britain, Conn.

CIRCULATOR, EQUILIBRIUM, with Steam Heating Attachment.
Bloomsburg & Co., H.....Newport News, Va.

CLOCKS (Marine), CHRONOMETERS, BELLS.
Ashton Valve Co.....Boston.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.
Castner, Curran & Bullitt.....Philadelphia.
Hanna, M. A. & Co.....Cleveland.
Ohio Fuel Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
Scott Co., The W. L.....Erie, Pa.

COAL AND ORE HANDLING MACHINERY.
Brown Hoisting Machinery Co., Incorporated..Cleveland.
Lidgerwood Mnfg. Co.....New York.
McMyler Mnfg. Co.....Cleveland.

COMPASSES.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS ADJUSTER.
Fields, J. M.....Cleveland.

CORK JACKETS AND RINGS.
Armstrong Cork Co.....Pittsburgh, Pa.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

CRANES, CONVEYORS, HOISTS.
Brown Hoisting Machinery Co., Incorporated..Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.
McMyler Mnfg. Co.....Cleveland.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

CRANK PINS.
Cleveland City Forge & Iron Co.....Cleveland.

DIVING APPARATUS.
Hale Rubber Co., Alfred.....So. Boston, Mass.

DOORS—PNEUMATIC AND ELECTRIC SAFETY POWER DOORS AND HATCHES.
"Long Arm" System Co.....Cleveland.

DRILL PRESSES—DRILLS OF ALL KINDS.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.

DRYING APPARATUS.
American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Sturtevant, B. F. Co.....Boston.

DRILLS, PNEUMATIC.
Standard Pneumatic Tool Co.....Chicago.

DRY DOCKS.
American Ship Building Co.....Cleveland.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Harlan & Hollingsworth Co.....Wilmington, Del.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Shipowners Dry Dock Co.....Chicago.
Townsend & Downey Ship Bldg. Co.....New York.
Union Iron Works.....San Francisco.

ELECTRIC AUTOMATIC WHISTLE OPERATORS.
Signal & Control Co.....New York.

ELECTRIC LIGHT AND POWER PLANTS.
Buffalo Forge Co.....Buffalo.
Bullock Electric Mnfg. Co.....Cincinnati.
Electro-Dynamic Co.....Philadelphia.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Seidler-Miner Electric Co.....Detroit.
Sturtevant, B. F. Co.....Boston.
Westinghouse Electric & Mnfg. Co.....Pittsburg, Pa.

ELECTRIC HOISTS AND CRANES.
Bullock Electric Mnfg. Co.....Cincinnati.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Lidgerwood Mnfg. Co.....New York.
Westinghouse Electric & Mnfg. Co.....Pittsburg, Pa.

ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.
Electro-Dynamic Co.....Philadelphia.

ENGINE BUILDERS, MARINE.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated.....New York.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lake Shore Engine Works.....Marquette, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Olds Motor Works.....Detroit.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.
Cory, Chas. & Son.....New York.
Electro-Dynamic Co.....Philadelphia.
Seidler-Miner Electric Co.....Detroit.

ENGINEERING SPECIALTIES AND SUPPLIES.
Crane & Co.....Chicago.
Reilly Repair & Supply Co., James.....New York.

ENGINEERS, MARINE AND MECHANICAL.
Electro-Dynamic Co.....Philadelphia.
Hunt, Robt. W. & Co.....Chicago.
Miller, Walter.....Cleveland.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V.....Chicago.
See, Horace.....New York.
Wood, W. J.....Chicago.

EVAPORATING AND DISTILLING APPARATUS.
Reilly Repair & Supply Co., James.....New York.

FANS FOR VENTILATION, EXHAUST, ETC.
American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FEED WATER PURIFIERS AND HEATERS.
Learmonth, Robert.....Buffalo.
Reilly Repair & Supply Co., James.....New York.
Reynolds, H. J.....Cleveland.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.
Page Bros. & Co.....Boston.
Porter's Sons' Co., Wm.....New York.

FORGES.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

FORGINGS.
Bourne-Fuller Co.....Cleveland.
Cleveland City Forge & Iron Co.....Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FURNACES FOR BOILERS.
Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.
Castner, Curran & Bullitt (Pocahontas).....Philadelphia.
Hanna, M. A. & Co.....Cleveland.
Ohio Fuel Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....Buffalo.
Scott Co., The W. L.....Erie, Pa.
Smith, Stanley B. & Co.....Detroit.
Youghiogheny & Lehigh Coal Co.....Chicago.

GAS BUOYS.
Safety Car Heating & Lighting Co.....New York.

GAS AND GASOLINE ENGINES.
Lake Shore Engine Works.....Marquette, Mich.
McMyler Mnfg. Co.....Cleveland.
Olds Motor Works.....Detroit.

GAGES, STEAM AND VACUUM.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

GRAPHITE.
Dixon Crucible Co., Joseph.....Jersey City, N. J.

GRAPHITE BUSHINGS AND BEARINGS.
Graphite Lubricating Co.....Bound Brook, N. J.

HAMMERS, PNEUMATIC.
Standard Pneumatic Tool Co.....Chicago.

HAMMERS, POWER DROP.
Chase Machine Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.

HATCH FASTENERS.
Mulholland, M.....Cleveland.

HATCH GEARS.
"Long Arm" System Co.....Cleveland.

HAWSERS, WIRE.
American Steel & Wire Co.....Chicago.

HEATING APPARATUS.
Sturtevant, B. F. Co.....Boston.

HOISTS FOR CARGO, ETC.
American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., Incorporated..Cleveland.
Chase Machine Co.....Cleveland.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....New York.
Hodge, S. F. & Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Lidgerwood Mnfg. Co.....New York.
McMyler Mnfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

HOSE FOR PNEUMATIC TOOLS.
Sayen & Schultz.....Philadelphia.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

IGNITERS FOR GAS ENGINES.
Holtzer-Cabot Electric Co.....Brookline, Mass.

INJECTORS.
Crane Co.....Chicago.
Jenkins Bros.....New York.

INSURANCE, MARINE.
Brown & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Helm, D. T. & Co.....Duluth, Minn.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
La Salle & Co.....Duluth.
Mitchell & Co.....Cleveland.
Osborn, F. H. & Co.....Chicago.
Parker, A. A. & W. B.....Detroit.
Peck, Chas. E. & W. F.....New York and Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

IRON ORE AND PIG IRON.
Bourne-Fuller Co.....Cleveland.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

LATHES OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.

LAUNCHES—NAPHTHA, ELECTRIC.
Gas Engine & Power Co.....New York.

LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.
Armstrong Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D.....New York.
Lane & DeGroot.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.
Page Bros. & Co.....Boston.
Porter's Sons' Co., Wm.....New York.

LOGS.
Walker & Son, Thomas.....Birmingham, Eng.
Also Ship Chandlers.

MACHINE TOOLS.
Niles Tool Works Co.....Hamilton, O.

MACHINE TOOLS (WOOD WORKING).
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

MALLETS FOR CAULKERS, BOILER MAKERS, ETC.
N. Y. Mallet & Handle Works.....New York.

MARINE RAILWAYS, BUILDERS OF
Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.
American Blower Co.....Detroit.
American Ship Building Co.....Cleveland.
Boston Blower Co.....Hyde Park, Mass.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.
U. S. Metallic Packing Co.....Philadelphia.

METALS FOR BEARINGS.
Cramp, Wm. & Sons.....Philadelphia.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.

METAL POLISH.
Bertram's Oil Polish Co.....Boston, Mass.
Paul & Co., J. C.....Chicago.

MILLING MACHINES OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.

NAUTICAL INSTRUMENTS.
Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.
See, Horace.....New York.
Wood, W. J.....Chicago.

OAKUM.
Stratford Oakum Co., Geo.....Jersey City, N. J.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph.....Jersey City, N. J.
Standard Oil Co.....Cleveland.

OUTFITTING OF VESSELS—CARPETS, FURNITURE, ETC.
Sterling, Welch & Co.....Cleveland.
Williams & Rodgers Co.....Cleveland.

PACKING.
Crane Co.....Chicago.
Garlock Packing Co.....Palmyra, N. Y.
Jenkins Bros.....New York.
Katzenstein, L. & Co.....New York.
Sayen & Schultz.....Philadelphia.
U. S. Metallic Packing Co.....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Smith, Edward & Co.....New York.
Upson-Walton Co.....Cleveland.

PATENT ATTORNEYS.
Thurston & Bates.....Cleveland.

PATTERN SHOP MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

PIPE THREADING AND CUTTING MACHINES.
Merrell Mnfg. Co.....Toledo, O.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland.
Crane Co.....Chicago.

PLANERS OF ALL KINDS.
Niles Tool Works Co.....Hamilton, O.

PLANING MILL MACHINERY.
Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

PLUMBING, MARINE.
Mott Iron Works, J. L.....New York.
Reilly Repair & Supply Co., James.....New York.
Sands, Alfred B. & Son.....New York.

PNEUMATIC TOOLS.
Standard Pneumatic Tool Co.....Chicago.

POLISH FOR METALS.
Bertram's Oil Polish Co.....Boston.
Paul & Co., J. C.....Chicago.

PRESSURE REGULATORS.
D'Este Co., Julian.....Boston.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Shipbuilding Co.....Detroit.
Farrar & Trefts.....Buffalo.
Fore River Ship & Engine Co.....Quincy, Mass.
Hardy, John B.....Tacoma, Wash.
Hyde Windlass Co.....Bath, Me.
Harlan & Hollingsworth Co.....Wilmington, Del.
Hodge, S. F. & Co.....Detroit.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Sheriffs Mnfg. Co.....Milwaukee.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G.....Buffalo.
Union Iron Works.....San Francisco.

PROJECTORS, ELECTRIC.
Bullock Electric Mnfg. Co.....Cincinnati.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Seidler-Miner Electric Co.....Detroit.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F. Mnfg. Co.....New York.
Kingsford Foundry & Machine Works.....Oswego, N. Y.
Wood, R. D. & Co.....Philadelphia.
Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.
Cleveland Punch & Shear Works Co.....Cleveland.
Niles Tool Works Co.....Hamilton, O.
Wood, R. D. & Co.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.
Standard Automatic Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland.
Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).
American Steel & Wire Co.....Chicago.

RUBBER GOODS.
Hale Rubber Co., Alfred.....So. Boston, Mass.

RUBBER INSULATED WIRES.
Roebling's Sons, John A.....New York and Cleveland.
American Steel & Wire Co.....Chicago.

SAFETY VALVES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.
Wilson & Silsby.....Boston.

SALVAGE COMPANIES.
See wrecking companies.

SEAM COMPOSITION AND ELASTIC SEAM PAINT.
Cole & Kuhls.....Brooklyn.

SEARCH LIGHTS.
Elwell-Parker Electric Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.
Rushmore Dynamo Works.....Jersey City, N. J.
Seidler-Miner Electric Co.....Detroit.
Westinghouse Electric & Mnfg. Co.....Pittsburg.

SHAPERS.
Niles Tool Works Co.....Hamilton, O.

SHEARS.
See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Shipbuilding Co.....Detroit.
Fore River Ship & Engine Co.....Quincy, Mass.
Hardy, John B.....Tacoma, Wash.
Harlan & Hollingsworth Co.....Wilmington, Del.
Jenks Ship Building Co.....Port Huron, Mich.
Lockwood Mnfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrow's Point, Md.
Moran Bros. Co.....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
Newport News Ship Building Co.....Newport News, Va.
Nixon, Lewis.....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works.....San Francisco.
Roach's Ship Yard.....Chester, Pa.
Townsend & Downey Ship Bldg. Co.....New York.
Trigg, Wm. R. Co.....Richmond, Va.
Union Iron Works.....San Francisco.
Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.
Baker, Howard H. & Co.....Buffalo.
Moran Bros. Co.....Seattle, Wash.
Reilly Repair & Supply Co., James.....New York.
Upson-Walton Co.....Cleveland.

SPARS—LARGE SIZES.
Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.
Holmes, Samuel.....New York.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
Erie & Western Trans. Co.....Buffalo.
International Nav. Co.....Philadelphia.
Red Star Line.....New York.

STEEL CASTINGS.

Seaboard Steel Casting Co.....Chester, Pa.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriffs Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co.....Chester, Pa.
International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.

American Bridge Co.....New York.

SUBMARINE DIVING APPARATUS.

Hale Rubber Co., Alfred.....So. Boston, Mass.

SURVEYORS, MARINE.

See, Horace.....New York.
Wood, W. J.....Chicago.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
Pittsburgh Testing Laboratory, Ltd.....Pittsburg.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co.....Peabody, Mass.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Cleveland Punch & Shear Works Co.....Cleveland.
New Doty Mnfg. Co.....Janesville, Wis.
Niles Tool Works Co.....Hamilton, O.
Standard Pneumatic Tool Co.....Chicago.
Wood, R. D. & Co.....Philadelphia.

TOOLS, WOOD WORKING.

Fay & Egan Co., J. A.....Cincinnati, O.
Atlantic Works, Inc.....Philadelphia.

TOPOPHONE—Prevents disasters in fogs.

Colt Co. J. B.....New York.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.....Midland, Ont.
Swain Wrecking Co.....Detroit.

TRAPS, STEAM.

D'Este Co., Julian.....Boston.
Haines Co., Wm. S.....Philadelphia.

TRUCKS.

Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.

Benedict & Burnham Mnfg. Co.....Waterbury, Conn.
Standard Seamless Tube Co.....Pittsburg.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crane Co.....Chicago.
Crosby Steam Gage & Valve Co.....Boston.
D'Este Co., Julian.....Boston.
Jenkins Bros.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.

Smith, Edward & Co.....New York.

VARNISH PAINT.

Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Drake & Maytham.....Buffalo.
Elphicke, C. W. & Co.....Chicago.
Hall & Root.....Buffalo.
Helm, D. T. & Co.....Duluth, Minn.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
Keith, J. G. & Co.....Chicago.
Kennedy Hunter & Co.....Antwerp.
Mitchell & Co.....Cleveland.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

VENTILATING APPARATUS FOR SHIPS.

American Blower Co.....Detroit.
Boston Blower Co.....Hyde Park, Mass.
Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co.....Chicago.
Baker, H. H. & Co.....Buffalo.
Roebling's Sons, John A.....New York and Cleveland.
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.
Crosby Steam Gage & Valve Co.....Boston.
Signal & Control Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.
Fay & Egan Co., J. A.....Cincinnati, O.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.....Midland, Ont.
Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Gas Engine & Power Co.....New York.
Lane & DeGroot.....Brooklyn.
Willard, Chas. P. & Co.....Chicago.

YAWLS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

Almy Water Tube Boiler Co..... 11
American Blower Co..... 40
*American Bridge Co..... 26
American Line 7
American Ship Building Co..... 1
American Ship Windlass Co..... 2
American Steam Gauge Co..... 1
American Steel & Wire Co..... 1
Armstrong Cork Co..... 40
Ashton Valve Co..... 12
Atlantic Works 5
*Atlantic Works, Inc..... 6

Babcock & Wilcox Co..... 11
Baldt Anchor Co..... 9
Baker, Howard H. & Co..... 6
Bath Iron Works, Ltd..... 1
Benedict & Burnham Mnfg. Co..... 28
Bertram's Oil Polish Co..... 1
Bessemer Steamship Co..... 8
Big Four Railway..... 39
Blake, Geo. F., Mnfg. Co..... 9
*Bliss, John & Co..... 30
*Bloomsburg & Co., H..... 31
Boland, J. J..... 34
Boston Blower Co..... 4
*Boston & Lockport Block Co..... 40
*Boyer Water Tube Boiler Co..... 31
Bourne-Fuller Co..... 12
Brown & Co..... 34
Brown Hoisting Machinery Co., Inc..... 2
Buffalo Dry Dock Co..... 11
Buffalo Forge Co..... 12
Bullock Electric Mnfg. Co..... 1

Castner, Curran & Bullitt..... 33
Champion Rivet Co..... 8
Chase Machine Co..... 6
Chicago Ship Building Co..... 2
Cleveland City Forge & Iron Co..... 6
Cleveland Punch & Shear Works Co..... 28
C. C. C. & St. L. R. R..... 39
Cole & Kuhls..... 9
Coleman & Sons, Walter..... 40
Colt Co., J. B..... 10
Continental Iron Works..... 2
Cory, Chas. & Son..... 10
*Craig Ship Building Co..... 30
Cramp, Wm. & Sons, S. & E. B. Co..... 1
Crandall & Son, H. I..... 7
Crane Co..... 6
Crosby Steam Gage & Valve Co..... 12

Dearborn Drug & Chemical Works..... 30
D'Este Co., Julian..... 3
Delauney, Belleville & Co..... 29
Delaware River Iron S. B. & E. Works. 5
Detroit Shipbuilding Co..... 1
Detroit Screw Works..... 11
Dixon Crucible Co., Joseph..... 9
Donnelly Salvage & Wrecking Co..... 32
Drake & Maytham..... 34
Drein, Thos. & Son..... 4
Duluth, South Shore & Atlantic Ry..... 39

Electro-Dynamic Co..... 1
Elphicke, C. W. & Co..... 34
Elwell-Parker Electric Co..... 2
Erie & Western Trans. Co..... 32

Falls Hollow Staybolt Co..... 4
Farrar & Trefts..... 5
Fay & Egan Co., J. A..... 7
Fields, J. M..... 34
Fletcher, W. & A. Co..... 4
Fogg, M. W..... 31
Fore River Ship & Engine Co..... 5

Garlock Packing Co..... 28
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated..... 31
General Electric Co..... 12
Gilchrist, Albert J..... 34
*Gleason-Peters Air Pump Co.....
Goerz, G. P..... 9
Goulder, Holding & Masten..... 34
Graphite Lubricating Co..... 9
Great Lakes Register..... 7

Haines Co., Wm. S..... ..
Hale Rubber Co., Alfred..... 9
Hall & Root..... 34
Hanna, M. A. & Co..... 32
Hardy, John B..... 4
Harlan & Hollingsworth Co., The..... 5
Helios-Upton Co..... 8
Helm, D. T. & Co..... 34
Herriman, F. D..... 7
Hodge, S. F. & Co..... 8
Holmes, Samuel..... 34
Holtzer-Cabot Electric Co..... 2
Hoyt, Dustin & Kelley..... 34
Hunt, Robert W. & Co..... 34
Hutchinson & Co..... 34
Hyde Windlass Co..... 40

International Anchor Co..... 9
International Navigation Co..... 7

Jenkins Brothers.....10-12
Jenks Ship Building Co..... 39

Kahnweiler's Sons, David..... 4
Katzenstein, L. & Co..... 4
Keith, J. G. & Co..... 34
Kennedy Hunter & Co..... 3
Kingsford Foundry & Machine Works.. 30

Lake Shore Engine Works..... 1
Lane & DeGroot..... 4
*Learmonth, Robert..... 30
Lidgerwood Mfg. Co..... 10
Lockwood Mnfg. Co..... 4
"Long Arm" System Co..... 3
L. S. & M. S. Ry..... 39

McMyler Mfg. Co..... 8
MacDonald, Ray G..... 34
MacKinnon Mfg. Co..... 8
Mair, John & Son..... 6
*Marine Iron Co..... 7
Martin-Barriss Co..... 8
Maryland Steel Co..... 5
Merrell Mnfg. Co..... 5
Midland Towing & Wrecking Co., Ltd.. 40
Miller, Walter..... 9
Mitchell & Co..... 34
Monongahela Iron & Steel Co..... 3
*Moran Bros. Co..... 39
*Mott Iron Works, J. L..... 10
Mulholland, M..... 33

Neafie & Levy Co..... 5
*Newhall Chain Forge & Iron Co..... 30
Newport News Ship Building & Dry Dock Co..... 5
New York Mallet & Handle Works..... 30
Niles Tool Works Co..... 3
Nixon, Lewis..... 5
North River Iron Works..... 4

*Ohio Fuel Co..... 39
Olds Motor Works..... ..
Osborne & Co., F. H..... 34

Page Bros. & Co..... 3
Parker, A. A. & B. W..... 32
Paul & Co., J. C..... 28
Peck, Chas. E. & W. F..... 7
Phosphor Bronze Smelting Co., Ltd..... 8
Pickands, Mather & Co..... 32
Pinney, Orestes C..... 34
Pittsburg Coal Co..... 33
Pittsburgh Testing Laboratory, Ltd..... 34
Porter's Sons' Co., Wm..... 4
Powell, Ambrose V..... 34
Pusey & Jones Co..... 5

Queen City Engineering Co..... 10

Red Star Line..... 7
*Reilly Repair & Supply Co., James..... 10
Reynolds, H. J..... 9
Richardson, W. C..... 34
Risdon Iron Works..... 5
*Ritchie & Sons, E. S..... 30
Roach's Ship Yard..... 5
Roberts Water Tube Boiler Co..... 11
Rochester & Pittsburgh Coal & Iron Co. 33
*Roebling's, John A. Sons Co..... 40
Rushmore Dynamo Works..... 4

Safety Car Heating & Lighting Co..... 31
Sands, Alfred B. & Son..... 10
Sayen & Schultz..... 1
Scherzer Rolling Lift Bridge Co..... 6
Scott Co., The W. L..... 32
Seaboard Steel Casting Co..... 29
See, Horace..... 34
Seidler-Miner Electric Co..... 8
Sheriffs Mfg. Co..... 10
Shipowners Dry Dock Co..... 12
*Signal & Control Co..... 7
Skinner Chuck Co..... 3
Smith, Edward & Co..... 1
Smith, Stanley B. & Co..... 33
Stratford Oakum Co., Geo..... 32
Standard Chain Co..... 10
*Standard Oil Co..... 31
Standard Releasing Hook Co..... 2
*Standard Pneumatic Tool Co..... 26
Standard Seamless Tube Co..... 29
Sterling, Welch & Co..... 32
Stirling Co..... 11
Stowe & Graydon..... 34
Sturtevant, B. F. Co..... 40
Sullivan & Co..... 34
Swain Wrecking Co..... 32

Thurston & Bates..... 34
Townsend & Downey Ship Bldg. Co..... 4
Trigg Co., Wm. R..... 4
Trout, H. G..... 9

Union Iron Works..... 5
Upson-Walton Co..... 40
U. S. Metallic Packing Co..... 40

Walker, Thomas & Son..... 3
Westinghouse Electric & Mnfg. Co..... 6
Wheeling & Lake Erie R. R..... 39
White, Johnson, McCaslin & Cannon... 34
Willard, Chas. P. & Co..... 30
Williams & Rodgers Co..... 32
Wilson, Thomas..... 34
Wilson & Silsby..... 6
Wood, W. J..... 34
*Wood & Co., R. D..... 30
Worthington, Henry R..... 9
Wright, Herbert & Co..... 34

Youghiogheny & Lehigh Coal Co..... 33

MORAN BROS. COMPANY

SEATTLE, WASHINGTON

SHIP AND ENGINE BUILDERS

STEEL AND WOOD VESSELS, STEAM OR SAIL

FOR OCEAN, SOUND AND RIVER SERVICE

FOUNDRY, MACHINE, BOILER AND FORGE SHOPS

LARGEST TOOLS AND EQUAL TO ANY REQUIREMENT

HEAVY FORGINGS A SPECIALTY

DRY DOCK AND MARINE RAILWAY

Two-Section balanced floating dry dock, 400 ft. long, 60 ft. between towers; patent steel wedge keel blocks; 12,000 tons displacement.

CAPACITY OF MARINE RAILWAY 1500 TONS

SHIP CHANDLERY, ENGINEERS' SUPPLIES

SAW AND PLANING MILL

CAPACITY: TIMBER, 48 INCHES SQUARE, 125 FEET LONG

Including every description of ROUGH, DRESSED or KILN DRIED

YELLOW FIR, RED CEDAR OR SPRUCE

We make a specialty of long and large timber and can DRESS FOUR SIDES 20 x 30 INCHES.

SPARS PILES — THE LONGEST, LARGEST, CLEAREST AND BEST IN THE WORLD; ROUGH OR HEWN. OR TIMBER OF ANY DESCRIPTION.

CARS FROM ALL TRANSCONTINENTAL ROADS ENTER OUR YARDS AND DOCKS

DOCK SHIPMENTS TO ALL PARTS OF THE WORLD

ELECTRIC CRANE Capacity to transfer 75 tons from car to vessel

WE INVITE CORRESPONDENCE

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE 237 SUPERIOR ST

	Eastward:—	Ar. fr. West.	Dep. East.
No. 18,	Southwestern Limited	.....	*1 55 am
No. 22,	Lake Shore Limited	*2 15 am	*2 20 am
No. 28,	New York & Boston Express	*7 40 am	*8 00 am
No. 32,	Fast Mail	*11 25 am	*11 30 am
No. 44,	Accommodation, via Sandusky	†1 35 pm	.....
No. 46,	Southwestern Express	.....	*3 00 pm
No. 6,	Limited Fast Mail	*5 40 pm	*5 45 pm
No. 10,	Chicago, New York & Boston Special	*7 35 pm	*7 40 pm
No. 61,	New England Express	*10 30 pm	*10 35 pm
No. 2,	Day Express	†9 05 pm	†9 20 pm
No. 126,	Norwalk Accommodation	†7 55 am	.....
No. 40,	Toledo & Buffalo Accom., via Norwalk	†10 00 am	†10 30 am
No. 106,	Conneaut Accommodation	.....	†4 30 pm

	Westward:—	Ar. fr. East.	Dep. West.
No. 11,	Southwestern Limited	*3 25 am	.....
No. 15,	New York, Boston & Chicago Special	*3 05 am	*3 10 am
No. 21,	New York & Chicago Express	*5 10 am	*5 20 am
No. 7,	Day Express	.....	†6 30 am
No. 19,	The Lake Shore Limited	*7 35 am	*7 40 am
No. 23,	Western Express	*11 10 am	*11 15 am
No. 33,	Southwestern Express	*12 25 pm	.....
No. 133,	Cleveland & Detroit Express	.....	*12 30 pm
No. 47,	Accommodation	.....	†3 00 pm
No. 141,	Sandusky Accommodation	.....	†3 10 pm
No. 127,	Norwalk Accommodation	.....	†5 10 pm
No. 37,	Pacific Express	*7 00 pm	*7 20 pm
No. 3,	Fast Mail Limited	*10 50 pm	*10 55 pm
No. 115,	Conneaut Accommodation	†8 30 am	.....

*Daily. †Daily except Sunday. Trains Nos. 28 and 37 run via Erie station.

J. N. MERWIN, G. P. A. E. B. COOLIDGE, A. G. P. A. CLEVELAND, O.

A SPRING OUTING!

Cheap Rates on account of Decoration Day

VIA "BIG FOUR."

On May 29th and 30th, the popular "Big Four Route" will sell tickets between all stations within a distance of 150 miles from starting point at a rate of ONE AND ONE-THIRD FARE for the round trip. Tickets will be good for return to and including May 31, 1901. For full information and particulars as to rates, tickets, limits, etc., call on Agents "Big Four" Route, or address the undersigned.

WARREN J. LYNCH, Genl. Pass. & Tkt. Agt. CINCINNATI, O.

W. P. DEPPE, A. G. P. & T. Agt. CINCINNATI, O.

D. JAY COLLYER, C. P. & T. A. 116 Euclid Ave. CLEVELAND.

WANTED, FOR SALE FOR CHARTER, Etc.

Space under this heading 25 cents a line, each insertion, for three insertions or less. Special rates for periods of more than three insertions.

—ENGINEERS' LICENSE—Mechanics, Engineers, Firemen, Electricians, etc., 40-page pamphlet containing Questions asked by Examining Board of Engineers. Sent free. Geo. A. Zeller, Publisher, Room 355, 18 S. 4th Street, St. Louis, Mo. May 30.

—FOR SALE OR CHARTER—British steamer of Welland canal dimensions; about 3,250 gross tons capacity, carrying about 2,000 gross tons on 14 ft. (fresh water) draught. Speed 10 knots loaded; easy consumption. Large hatchways. Address "Charter," The Marine Review Pub. Co., Cleveland. June 7.

—FOR SALE—After June 1 we will sell the fishing and towing steamer Alice, 70 by 14½ ft. Boiler 9 ft. by 5 ft. 3 in., allowed 120 lbs. steam. Engine 13x14 in. Wm. Smith & Co., Waukegan, Ill. May 21.

—FOR SALE—Balanced compound marine engines, 20 to 200 H.P. Immediate delivery. Patterns for larger sizes and for quadruple expansion engines. Wells Engineering Co., 136 Liberty street, New York City. July 25.

—WANTED—Agents to call on all consumers of polishes, particularly yachts, steamers, etc. Bertram's Oil Polish Co., Boston, Mass. tf

—FOR SALE—Complete plant for steel ship building. P. O. Box 23, Perth Amboy, N. J.

—FOR SALE—Harbor tugs Owen and Delta. Engines 20x20 and 20 x22 in., respectively. Good boats. Cheap for cash. Ranney Bros., 65 Merwin St., Cleveland. tf.

—FOR SALE—Scott's Coast Pilot, 1901 edition. Great lakes and connecting waters. Fully revised. Price, $1.50. The Marine Review Pub. Co., Cleveland. tf

—FOR SALE—Charts of all the world. Charts of the great lakes always in stock. United States Hydrographic Office charts, Coast Survey charts, Army Engineer charts. We bind charts and back them with tape, so that they will last for years. The Marine Review Pub. Co., Cleveland. tf

THE Marquette ROUTE

DULUTH, SOUTH SHORE AND ATLANTIC RAILWAY.

The Only Line Reaching MARQUETTE, MICH.

"The Queen of Northern Summer Resorts."

Hotel Accommodations thoroughly first-class, headed by the Hotel Superior, the finest Hostelry on the Great Lakes.

GEO. B. ROSS, Lessee, HOTEL SUPERIOR, MARQUETTE, MICH.; Proprietor LEXINGTON HOTEL, CHICAGO, ILL.; formerly Manager CHICACO BEACH HOTEL.

—WRITE THE UNDERSIGNED FOR ILLUSTRATED PUBLICATIONS.—

E. C. OVIATT, Trav. Pass. Agent, 76 Ottawa St., GRAND RAPIDS, MICH.

G. A. CLIFFORD, Trav. Pass. Agent, CINCINNATI, OHIO.

A. E EDMONDS, City Pass. Agent, DETROIT, MICH.

F. W. SALSBURY, Commercial Agent, PITTSBURG, PA.

J. F. LEE, Gen'l Agt. Pass. Dept., 228 So. Clark St., CHICAGO, ILL.

GEO. W. HIBBARD, Gen'l Pass. Agent, MARQUETTE, MICH.

W. S. JENKS, President. O. L. JENKS, Vice-Pres. and Treas. A. M. CARPENTER, Sec. and Gen'l Mgr.

The Jenks Ship Building Co.

Office and Machine Shops at Fourth St. Yards: Foot of Lincoln Ave.

PORT HURON, MICH.

Steel and Wood Ship Builders.
Marine Engines and Boilers.

STEAM WINDLASSES,
CAPSTANS AND
STEERING APPARATUS.

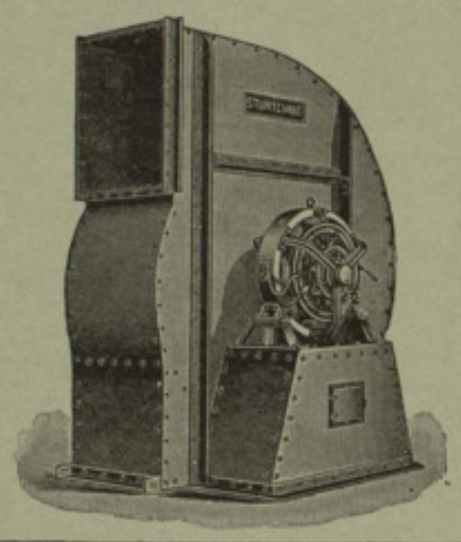
PROMPT ATTENTION GIVEN TO REPAIRS OF ALL KINDS ON SHIPS, ENGINES AND BOILERS.

OPERATES THE ONLY THROUGH BUFFET PARLOR CAR LINE Between Cleveland, Canton and Wheeling.

Wheeling and Lake Erie R. R.

STURTEVANT ELECTRIC FANS

In 100 types and sizes.
Special designs for requirements.
We build both fan and motor.

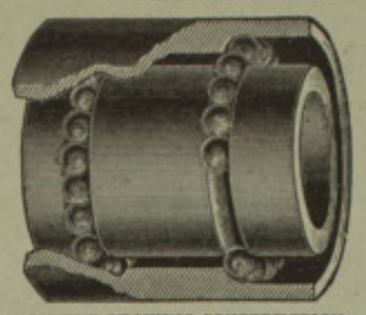


ALSO
Blowers
Exhausters
Steam Fans
Engines
Electric Motors
Generating Sets
Forges
Exhaust Heads
Steam Traps
Heating
Ventilating and
Drying Apparatus
Mechanical Draft
151

B.F. STURTEVANT Co. BOSTON,
NEW YORK · PHILADELPHIA · CHICAGO · LONDON ·

The Upson-Walton Co.,

155-161 RIVER STREET, CLEVELAND, OHIO,

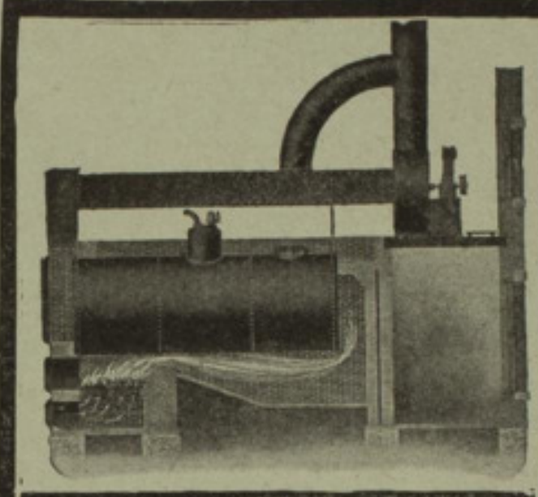


SLEEVE SHOWING CONSTRUCTION.
BALL BEARING SHEAVES,
THE LATEST IMPROVEMENT

SELL THE

Cleveland Block

TO BE FOUND ON NEARLY ALL THE MODERN LAKE VESSELS.



American Blower Company

DETROIT, MICH.

NEW YORK. CHICAGO. LONDON.

Our New Catalogue No. 118 will tell how to save money by employing
Mechanical Draft
COPY MAILED ON REQUEST

J. L. CLINE Adv. Def.

U. S. METALLIC PACKING CO.

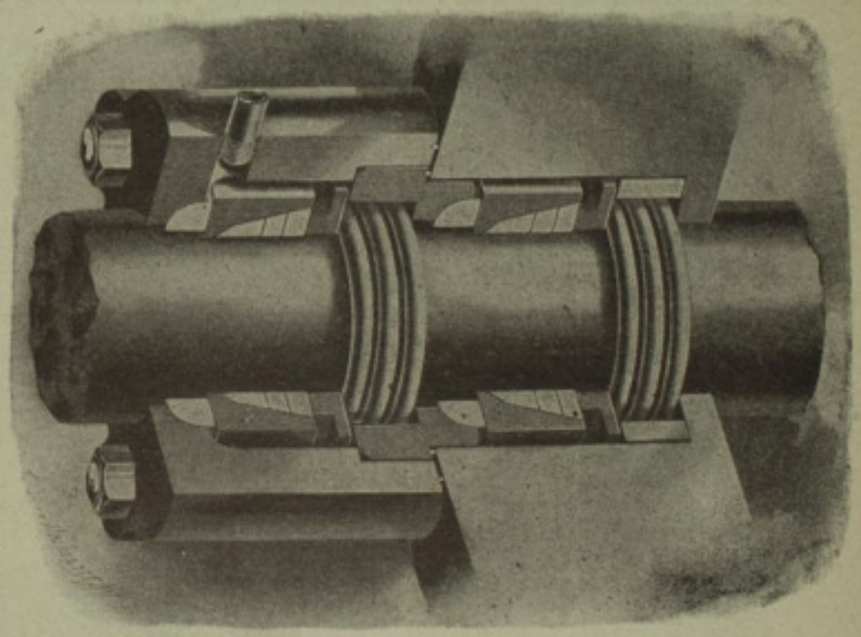
429 N. 13th St. PHILADELPHIA PA.

120,000 PACKINGS IN USE.
12,000 APPLIED IN 1899.

Extensively Used on Ocean, Lake, and Stationary Engines.
Cheap, Durable and Small Cost for Repairs.

Silver Medal Awarded Paris, 1900.

SEND FOR CATALOGUE.



COLEMAN'S BLOCKS

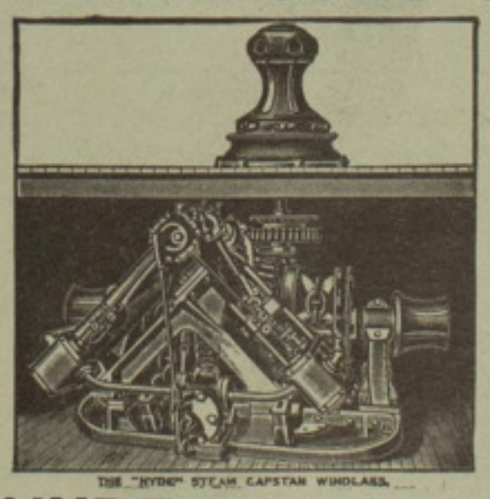
NEW WRINKLES

RUBBER COVERED WIRES AND CABLES

WIRE ROPE

CLEVELAND STORE, 88 Superior Street.

WINDLASSES AND CAPSTANS



THE "HYDE" STEAM CAPSTAN WINDLASS.

The Hyde Steam and Power Windlasses and Capstans are the best in the market.

They have been selected for most of the vessels now building for the Navy Department, Revenue Marine, Light-house Board and United States Coast Survey.

They are being furnished for the majority of the highest class Steam Ships, Merchant Vessels and Yachts now building.

HYDE WINDLASS CO., Bath, Me.

LIFE PRESERVERS—BUOYS.

Acme, Solid Cork. Granulated Cork.

EACH PRESERVER stamped by United States Inspector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY,

Boston. New York. Philadelphia. Pittsburg. Chicago. St. Louis. Baltimore.

Midland Towing & Wrecking Co., Ltd.

MIDLAND, ONT., CANADA.

JAMES PLAYFAIR, {Pres't and Gen. Mngr.
D. L. WHITE, Vice-Pres.
J. W. BENSON, Sec'y and Treas.

FIRST-CLASS TUGS FOR WRECKING, RAFT TOWING, ETC.

STEAM PUMPS, DIVERS, JACKS, HAWSERS, LIGHTERS.

THE BEST ARE ACKNOWLEDGED THE

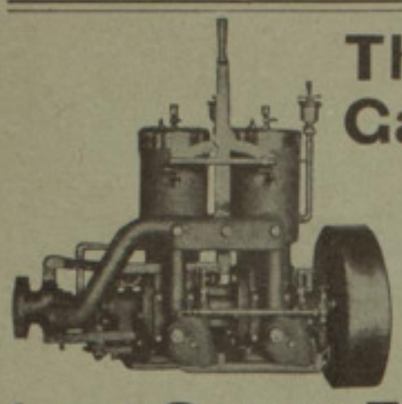
1901 CATALOGUE TELLS THE REST

Walter Coleman & Sons,
PROVIDENCE, RHODE ISLAND.
1778-1901

WE BLOCK THE CUP DEFENDERS

MARINE REVIEW

VOL. XXIII. CLEVELAND, O., MAY 16, 1901. No. 20.



The Superior Marine Gasoline Engine

IS BUILT FOR HEAVY SERVICE.

Every sail boat and steamer should carry one in a tender. Small schooners save tug bills. One in a delivery boat pays for itself the first year. Built in single, double and triple cylinders. Send for catalogue and description of how it acted in a U. S. life-boat.

LAKE SHORE ENGINE WORKS, Marquette, Mich.

The Wm. Cramp & Sons Ship and Engine Building Co.

PHILADELPHIA.

SOLE MANUFACTURERS IN AMERICA OF

Parsons Manganese Bronze AND Parsons White Brass.

EDWARD W. HYDE, President. H. H. McCARTY, Treasurer.
JOHN S. HYDE, Vice-Pres. and Gen'l Supt.

BATH IRON WORKS, Ltd.

Ship Builders and Engineers,

BATH, MAINE.

W. L. BROWN, President.
R. L. IRELAND, Vice-president.
R. C. WETMORE, Sec'y and Treas.
JAS. C. WALLACE, Gen'l Manager.

DRY DOCKS IN CLEVELAND:
No. 1, foot Weddell St., 440 ft. x 50 ft. x 16 ft.
No. 2, foot Weddell St., 300 ft. x 55 ft. x 13 ft.
No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain: 560 ft. x 60 ft. x 17 ft.

The American Ship Building Co.

OFFICE, 120 VIADUCT, CLEVELAND, O.

STEEL SHIPS

MARINE AND STATIONARY ENGINES.
BOILERS AND AUXILIARY MACHINERY.

PROMPT ATTENTION GIVEN TO SHIP REPAIRING OF ALL KINDS.

WORKS AT CLEVELAND AND LORAIN.

COMPLETE ELECTRIC PLANTS

FOR MARINE PURPOSES.

WE CATER TO THE DISCRIMINATING BUYER.

THE ELECTRO-DYNAMIC CO.

212-226 Ionic Street, Philadelphia, Pa., U. S. A.

Cable Address: EDCO, A B C Code.

WIRE HAWSERS RIGGING

GALVANIZED.
STRONGEST.
MOST SATISFACTORY.

AMERICAN STEEL & WIRE COMPANY, - THE ROOKERY, - CHICAGO, ILL.

ALEXANDER McVITTIE, President and Manager.
WILLIAM C. McMILLAN, Vice-President.
CHARLES B. CALDER, General Superintendent.
M. E. FARR, Secretary and Treasurer.
FRANK E. KIRBY, Consulting Engineer.

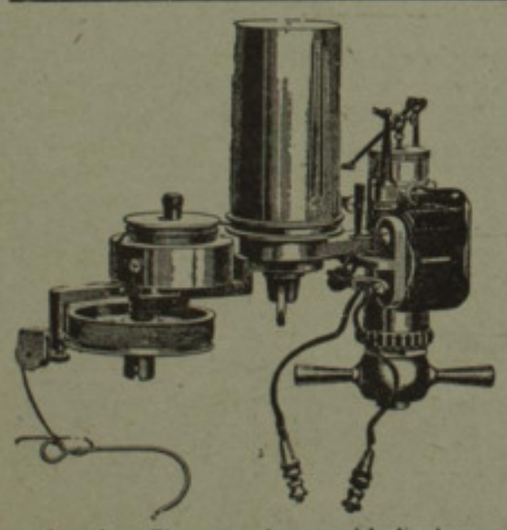
DETROIT SHIPBUILDING COMPANY,

SHIP AND ENGINE BUILDERS,

DETROIT, MICH.

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM, as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Mich.
Wooden Ship Yards and Dry Docks, Foot of Orleans Street, and Foot of Clark Ave., DETROIT, MICH.



American Thompson Improved Indicator with Reducing Wheel and Electrical Attachment.

American Steam Gauge and Valve Mnfg. Co.

(Original Steam Gauge Company.)

New York. BOSTON. Chicago.

MANUFACTURERS OF

GAUGES THAT GAUGE,
INDICATORS THAT INDICATE,
POPS THAT POP.

Clocks, Revolution Counters, Whistles, and all kinds of Steamship Instruments. Original and only Genuine Thompson Indicator.

HIGHEST AWARD at the PARIS EXPOSITION.
THE ONLY AMERICAN INDICATOR TO RECEIVE A MEDAL.

TRADE MARK.

SPAR COATING.

A perfect finish for all wood work, spars and iron work exposed to excessive changes in weather and temperature.

EDWARD SMITH & CO.,

Varnish Makers and Color Grinders

45 BROADWAY, NEW YORK.

BULLOCK DYNAMOS AND MOTORS

BULLOCK ELECTRIC MFG. CO.
CINCINNATI, OHIO.

EVERY PACKAGE OF BERTRAM'S POLISH, OIL AND PASTE (except 3 and 8-oz. Cans) CONTAINS ONE OF OUR "20TH CENTURY LUCK COINS." TRY A PACKAGE OF THE BEST POLISH IN THE WORLD AND SECURE YOUR CENTURY'S LUCK. ORDER FROM SHIP CHANDLERS AND ENGINEERS' SUPPLIERS.

BERTRAM'S OIL POLISH CO., BOSTON, MASS.

Bertram's Polish

LUCK FOR 20th CENTURY IN MOST POPULAR POCKET PIECE EVER INVENTED.

SAYEN & SCHULTZ,
Mechanical Rubber Works,
PHILADELPHIA, PA.

HOSE, BELTING, VALVES, ETC., FLAX AND GUM CORE PACKINGS FROM FACTORY TO CONSUMER.

"MELVILLE" PATENT SHEET GUM WITH WIRE GAUZE INSERTION WILL NOT BLOW OUT.

RUBBER GOODS

THE BROWN HOISTING MACHINERY CO. INCORPORATED

Engineers, Designers and **Manufacturers** of special machinery for hoisting, conveying, storing and handling material of all kinds under the well-known **"Brownhoist"** patents.

BRIDGE UNLOADERS
for rapidly discharging bulk cargoes from vessels directly to cars or to storage on docks.

FAST PLANT UNLOADERS
for rapidly handling either bulk or package freight.

CRANES
of every description for every kind of service.

Main Office and Works, CLEVELAND, O., U. S. A.
Eastern Office, 26 Cortlandt St., New York City.
Pittsburg Office, Carnegie Building, Pittsburg, Pa.
European Office, 39 Victoria St., London, S. W.

GENERATORS — ELWELL-PARKER ELECTRIC CO. OF AMERICA MANUFACTURERS GUARANTEES QUALITY CLEVELAND, OHIO. — MOTORS

STANDARD MARINE GENERATING SETS. COMPLETE HOISTING AND POWER PLANTS.

AMERICAN SHIP WINDLASS CO., Ship Machinery.

P. O. Box 53, **PROVIDENCE, R. I.**
Send for Catalogue. Address FRANK S. MANTON, Agent.

Sole Builders of the **ORIGINAL and ONLY AUTOMATIC STEAM TOWING MACHINE.**

WILLIAM L. BROWN, President. B. W. WELLS, Vice-President. O. R. SINCLAIR, Sec'y and Treas. JOHN A. UBSDELL, Jr., Genl. Mngr.

CHICAGO SHIP BUILDING COMPANY,

Long Distance Telephones.
Ship Yard and Dry Dock Office, "South Chicago 40."
Chicago Office, 1125 Rookery, "Harrison" 1207.

STEEL SHIP BUILDERS AND DRY DOCK PROPRIETORS.

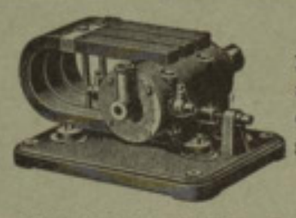
Dry Dock and Yards: 101st St. and Calumet River, CHICAGO, ILL.

Standard Automatic Releasing Device.

THE FALLS ARE SO ROVE THAT BOTH ENDS OF THE BOAT DETACH, IRRESPECTIVE OF WHICH END STRIKES THE WATER FIRST.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.

Standard Automatic Releasing Hook Co.,
NEW CHEESEBROUGH BUILDING,
17 State Street, New York, N. Y



A BIG FAT SPARK EVERY TIME
if you use our Magneto Igniter. Expense and annoyance of batteries avoided, and continuous, satisfactory operation of gas or gasoline engine assured. Special styles for automobiles and launches.
Send for our new booklet X for full particulars. It will interest you.

THE HOLTZER-CABOT ELECTRIC CO., BOSTON, (Brookline) MASS.
New York Office, 115 Broadway. Chicago Office, 397 Dearborn St.

Three Excellent Little Books FOR MARINE ENGINEERS.

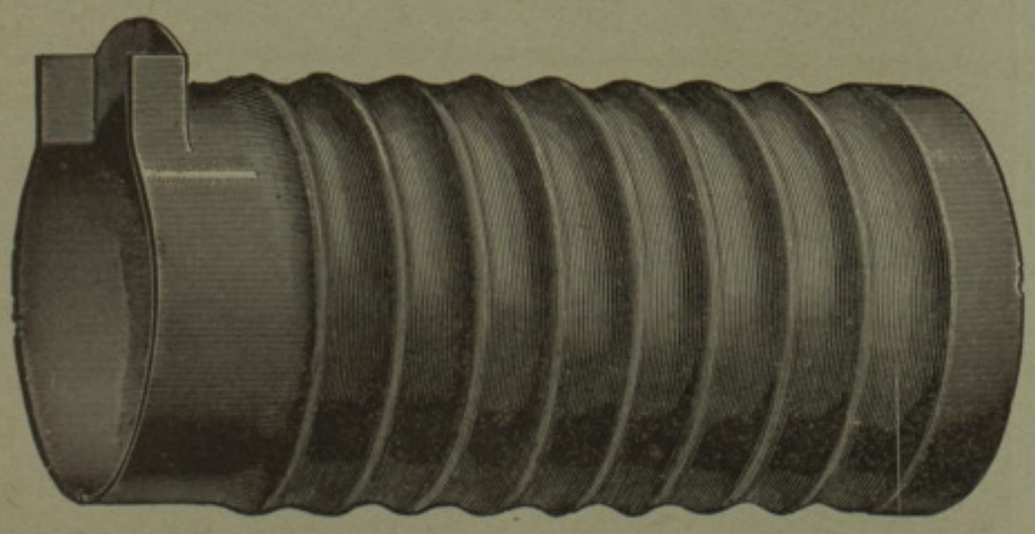
"KEY TO ENGINEERING."

"WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY."

"ENGINEER'S EPITOME."

Any one of these is worth a dollar. All three may be had for a dollar from the Marine Review Pub. Co., 418-419 Perry-Payne Building, Cleveland.

MORISON SUSPENSION BOILER FURNACES



—FOR—

LAND and MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.

Also Fox Corrugated Furnaces.

Manufactured by

THE CONTINENTAL IRON WORKS,

West and Calyer Sts. NEW YORK
Near 10th and 23d Sts. Ferries. Borough of Brooklyn

THE "LONG ARM" SYSTEM CO.

Cor. Lake and Wason Sts., CLEVELAND, O., U S. A.

BUILDERS OF

PNEUMATIC AND ELECTRIC | Safety Power Doors and Hatch Gears for Ships.

SPECIAL AIR COMPRESSORS FOR MARINE WORK.

To Admiralty Lawyers.

FOR ALL LAWYERS, IN FACT, AND ALL OWNERS OF REFERENCE LIBRARIES.

We are offering a nautical encyclopedia, carefully revised, and up to date in all respects. Deals with 5,000 subjects and contains 500 descriptive engravings. Explains every term in the great mass of sea literature.

It should interest every member of the naval, revenue, coast survey, transport and light-house services, for it is an invaluable reference work for them. It goes thoroughly into every feature of these services. It should interest also members of the merchant marine, yachtsmen, builders of steam and sailing vessels and underwriters.

Edited by HOWARD PATTERSON,
Author of several similar works.

JUST FROM THE PRESS.

Price only $3.

THE MARINE REVIEW PUB. CO.,
CLEVELAND, O.

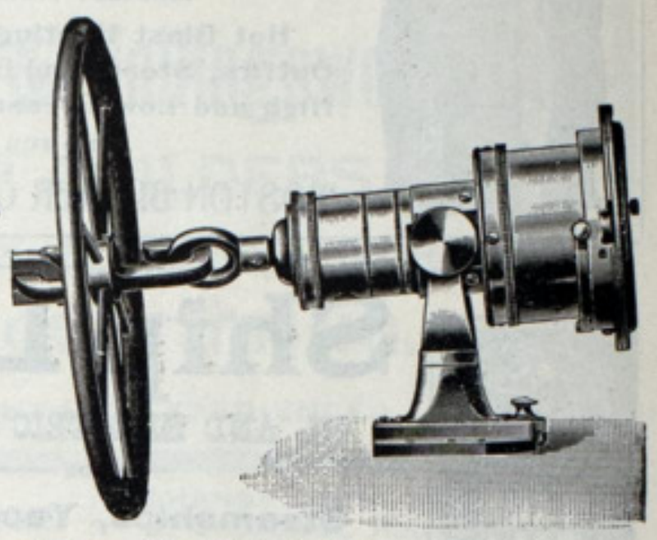
THOMAS WALKER & SON,

BIRMINGHAM, ENGLAND.

THE "NEPTUNE" SHIP-LOG WITH BALL BEARINGS FOR HIGH SPEEDS.

Particulars on Application.

SOLD BY ALL SHIP CHANDLERS.



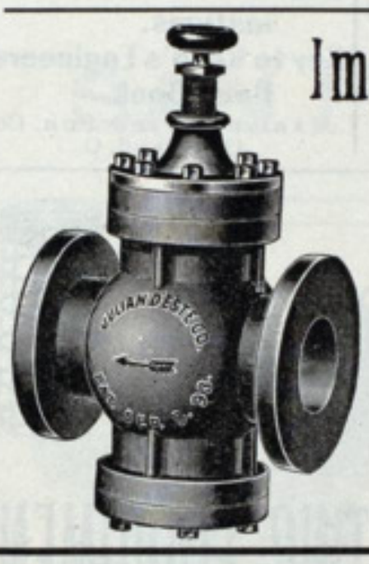
As used in the British Navy.

KENNEDY HUNTER & CO.,

ANTWERP,

SHIP BROKERS, STEAMSHIP AND FORWARDING AGENTS.

AGENTS for BELGIAN, BRAZIL and RIVER PLATE MAIL LINE; MESSRS. LAMPORT & HOLT, of Liverpool; GENERAL STEAM NAVIGATION CO.'S LINE, ANTWERP to LONDON. Regular Lines of Steamers to SPAIN, PORTUGAL, ITALY, MEDITERRANEAN, BLACK SEA, and DANUBE Ports. Direct steamships to BOMBAY and KURRACHEE, CHINA and JAPAN. Direct Sailers to SAN FRANCISCO. Branches:—PARIS, CHARLEROI, BRUSSELS, and RUHRORT.



Improved Pressure Regulator

FOR STEAM.

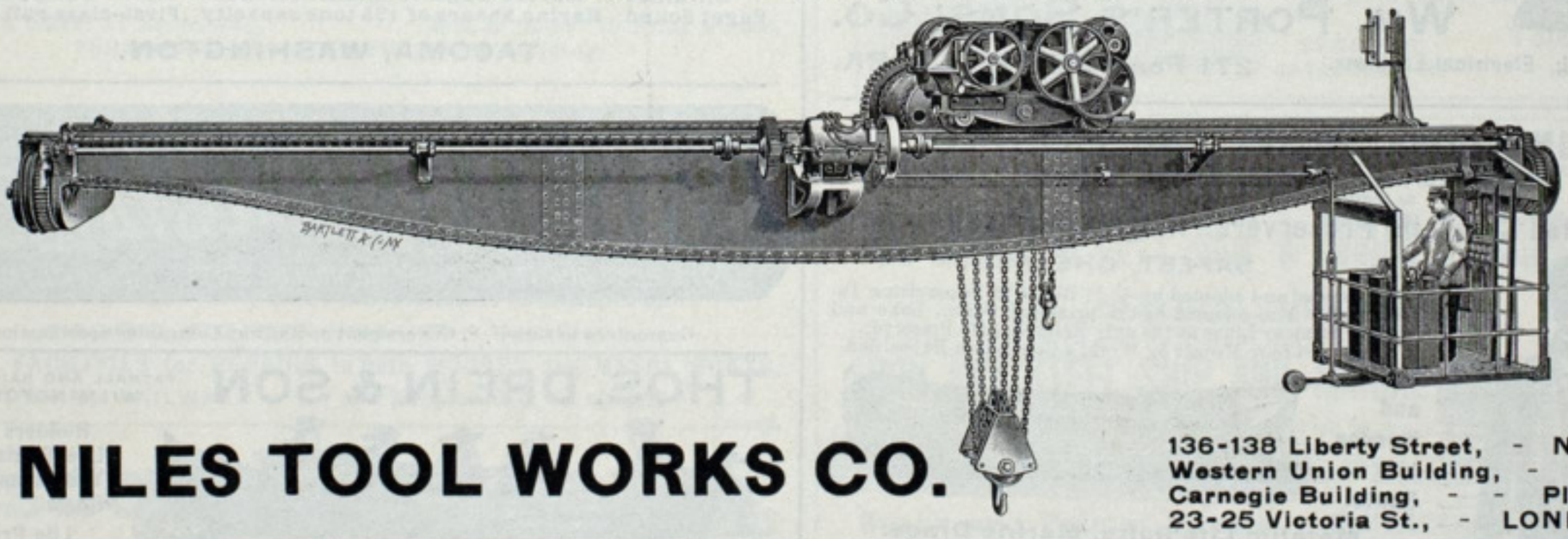
In use on Steamships, for deck machinery, pumps, supplying steam to engines at lower than boiler pressure, for steam heating; or, in any place where it is desired to reduce from a higher to a lower pressure automatically.

SEND FOR CATALOGUE.

JULIAN D'ESTE COMPANY,
24 Canal Street. BOSTON, MASS.

REASONABLE DELIVERIES

NILES ELECTRIC TRAVELING CRANES.



BUILT ON LATEST AND MOST IMPROVED DESIGNS.

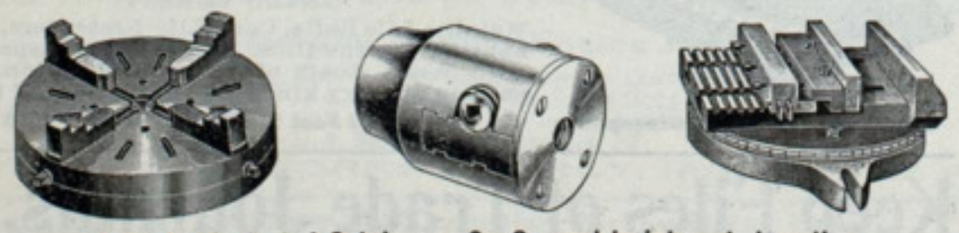
APPLY TO

NILES TOOL WORKS CO.

136-138 Liberty Street, - NEW YORK.
Western Union Building, - CHICAGO.
Carnegie Building, - - PITTSBURG.
23-25 Victoria St., - LONDON, ENG.

SKINNER CHUCKS

For LATHES, DRILLS and PLANERS



A finely illustrated Catalogue, 6 x 9, sent to interested parties.

THE SKINNER CHUCK CO., 340 CHURCH STREET. NEW BRITAIN, CONN.

Monongahela Iron and Steel Co.

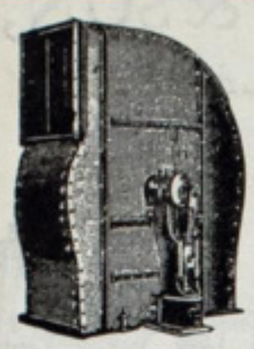
MANUFACTURERS OF

CHARCOAL BAR IRON **CARTER BRANDS** CHARCOAL IRON CHAINS

ALL SIZES.

United States Government Specifications Guaranteed.

PITTSBURGH, PA.



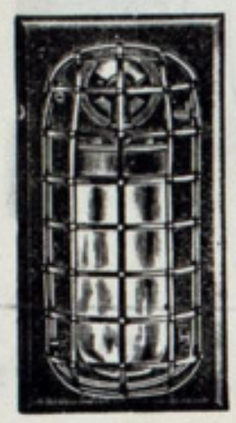
Fan and Pressure Blowers,

EXHAUST FANS FOR ALL USES.

Hot Blast Heating Apparatus, Dry Kiln Outfits, Steam and Electric Fans, Forges, High and Low Pressure Engines.

SEND FOR CIRCULARS.

BOSTON BLOWER CO., Hyde Park, Mass.



Ship Lamps

OIL AND ELECTRIC FIXTURERS

— FOR —

Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.

SEARCH LIGHTS - - -

RUSHMORE PROJECTORS are in almost exclusive use in all classes of service, and are specified for finest Steamers and Yachts.

RUSHMORE DYNAMO WORKS,

TELEPHONE 559. JERSEY CITY.

Reed's Engineers' Hand Book.

Reed's Guide to Examinations.

Key to Reed's Engineers' Hand Book.

MARINE REVIEW PUB. Co., Cleveland, O.

MARINE LIGHTING EQUIPMENT.

WM. PORTER'S SONS' CO.

F. J. RUSSELL, Electrical Engineer. 271 Pearl St., NEW YORK.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 pounds. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST, CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver.

Awarded four Medals by World's Columbian Exposition.

Metallic and Wooden Life Boats.

Metallic Life Rafts. Marine Drags.

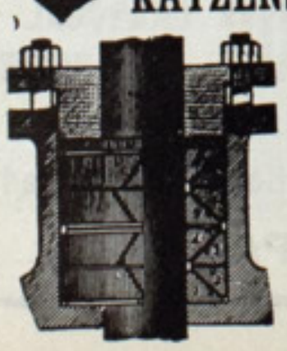
Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact Life Raft known.

DAVID KAHNWEILER'S SONS

437 Pearl Street, NEW YORK CITY.

Send for Illustrated Catalogue.

KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,

General Machinists, Brass Finishers, Engineers' Supplies,

357 West St., New York.

THE LOCKWOOD MANUFACTURING CO.

IRON WORKS AND DOCKS,

61 to 85 Sumner Street, EAST BOSTON, MASS.

BUILDERS OF

Steamships, Tow Boats and Marine Engines.

REPAIRING OF EVERY DESCRIPTION.

Builders of the Celebrated LOCKWOOD PROPELLER WHEELS.

WM. R. TRIGG COMPANY,

SHIP BUILDERS, RICHMOND, VA.

Government Contractors,

Building United States Torpedo Boats

SHUBRICK, STOCKTON and THORNTON,

and Torpedo Boat Destroyers DALE and DECATUR.

SHIPBUILDING IN ALL ITS BRANCHES.

W. & A. FLETCHER CO.

NORTH RIVER IRON WORKS.

Marine Engines, Boilers, Etc.

Hudson, 12th and 14th Streets, Hoboken, N. J.

Take Ferry from foot of West 14th Street, N. Y

THE TOWNSEND AND DOWNEY SHIPBUILDING AND REPAIR CO.,

ENGINEERS AND OUTFITTERS, DRY DOCKING AND REPAIRING.

BUILDERS OF STEEL AND WOODEN VESSELS OF ALL TYPES.

CAPACITY No. 1 DRY DOCK, 4,000 TONS.

Ship Yard and Works, Shooter's Island, Borough of Richmond, New York City.

New York Offices, 22 and 23 D. Produce Exchange.

Cable Address: "TEEANDE," N. Y. TELEPHONE CALLS: N. Y. Office, 500 Broad. Yard and Works, 97 West Brighton.

JOHN B. HARDY, BUILDER OF STEAM VESSELS

EITHER STEEL OR WOOD.

All kinds of Marine Engines and Machinery. Finest Equipped Shop on Puget Sound. Marine Shears of 125 tons capacity .First-class rail facilities.

TACOMA, WASHINGTON.

Guaranteed to pass U. S. Government or Railway Companies Specifications.

THOS. DREIN & SON

TATNALL AND RAILROAD STS. WILMINGTON, DEL.

Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats.

Life Preservers.

Outfit for Lake Steamers a Specialty.

Telephone Call 340-B, Greenpoint.

LANE & DeGROOT,

METALLIC LIFE BOATS,

(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, Etc., approved by the U. S. Supervising Inspectors. Also Wood Boats of Every Description. Repairing of every kind promptly attended to.

70 and 72 Kent St., BROOKLYN, NEW YORK.

Keep Files of Trade Journals.

A handy and substantial binder, into which each issue may be securely and neatly placed with trifling effort, may be had at $1. Thousands of them in use.

The only device that has proven satisfactory for this purpose.

THE MARINE REVIEW PUB. CO., Perry-Payne Building, Cleveland.

ROACH'S SHIP YARD.

DELAWARE RIVER
IRON
SHIP-BUILDING &
ENGINE WORKS,
CHESTER PA.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

New York Office, Morgan Iron Works, Foot East Ninth St

SHIP AND ENGINE BUILDERS.

Newport News Shipbuilding and Dry Dock Company.

Equipped with a Simpon's Basin Dry Dock capable of docking a vessel 600 feet long drawing 25 feet of water, at any stage of the tide Repairs made promptly and at reasonable rates.

For estimates and further particulars, address

C. B. ORCUTT, President,
NO. 1 BROADWAY, NEW YORK.

WORKS AT NEWPORT NEWS, VA.
(ON HAMPTON ROADS.)

MARYLAND STEEL CO.,

Marine Department.

Ship Builders and Engineers

SPARROW'S POINT, MD.

Baltimore Telephone No. 11. A. G. WILSON, Manager.

Long Distance Telephone Service Between New York, Philadelphia, Boston and Sparrow's Point Offices.

New York Office: 71 Broadway. Boston Office: 70 Kilby Street.
Philadelphia Office: 312-319 Girard Building.

The Pusey & Jones Company,

WILMINGTON, DELAWARE.

Builders of **IRON AND STEEL STEAMERS, STEAM YACHTS, TOW BOATS, MARINE ENGINES, BOILERS, TANKS, AND OF HEAVY MACHINERY GENERALLY.**

ALSO COPPERSMITH WORK.

SPECIAL FACILITIES for REPAIRS to both WOODEN and METAL BOATS.

MARINE RAILWAY. NO WHARFAGE CHARGED.

Risdon Iron Works,

IRON AND STEEL SHIP BUILDERS,

SAN FRANCISCO.

FORE RIVER SHIP AND ENGINE COMPANY,

SUCCESSORS TO Fore River Engine Co.

Steel Ship and Marine Engine Builders.

CONTRACTORS FOR
- U. S. Torpedo Boat Destroyers Lawrence and Macdonough.
- U. S. Protected Cruiser Des Moines
- U. S. Battleships New Jersey and Rhode Island.
- U. S. Steam Light-Vessel No. 72.

OFFICE AND WORKS: QUINCY, MASS., U. S. A.

FARRAR & TREFTS,

Propeller, Yacht and Tug Wheels.
Marine and Stationary Engines & Boilers.
Repairing Promptly Attended to.
Drilling Boilers and Engines a Specialty.

64 to 66 Perry Street, BUFFALO, N. Y.

WORKS AND MAIN OFFICE, WILMINGTON, DEL.

The Harlan & Hollingsworth Co.

SHIP BUILDERS, DRY DOCKING, REPAIRING AND OUTFITTING.

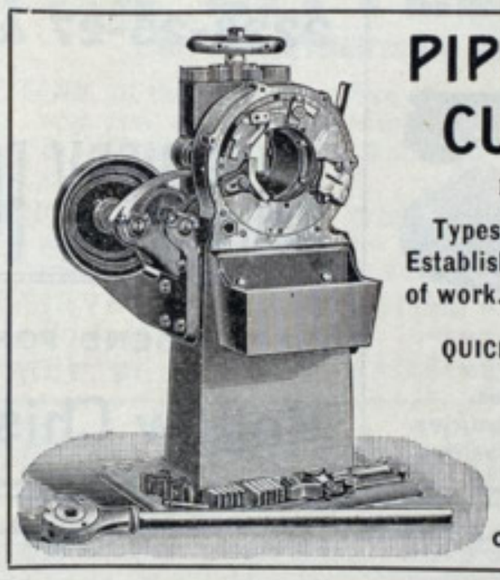
(3-4 CENTURY EXPERIENCE.)

NEW YORK OFFICE, { EXCHANGE COURT BUILDING, 52 BROADWAY, ROOM 702.

UNION IRON WORKS

SHIP BUILDERS,

SAN FRANCISCO.



PIPE THREADING AND CUTTING MACHINES

HAND OR POWER.

Types combining all that is LATEST and BEST. Established reputation for durability and rapidity of work.

GREAT RANGE OF WORK.
QUICK CHANGE FROM SIZE TO SIZE OF PIPE.
GEARS COMPLETELY HOUSED.

MERRELL MNFG. CO.

SEND FOR CATALOGUE R. Toledo, Ohio, U. S. A.

MATHIAS SEDDINGER, President.
SOMMERS N. SMITH, Vice-Pres't and Gen'l Mgr. ESTABLISHED 1838.

THE NEAFIE & LEVY SHIP & ENGINE BUILDING COMPANY,

PENN WORKS.

IRON AND STEEL SHIP AND MARINE ENGINE BUILDERS.

SOLE MAKERS OF THE WELL KNOWN

PHILADELPHIA PROPELLER WHEEL.

Beach and Palmer Streets, PHILADELPHIA, PA., U. S. A.

The Atlantic Works,

BUILDERS OF ..... STEAMSHIPS, STEAM YACHTS, TOW BOATS, ETC.

EAST BOSTON, MASS.

Marine Engines, Boilers and Tanks,
Heavy Machinery and Plate Iron Work.

LEWIS NIXON, SHIP BUILDER

Office and Works, ELIZABETH, N. J.

Builder of Stern-wheel, Paddle and Screw Steamers; also Torpedo Boats and Barges of all kinds in Steel.

A Specialty made of South American and Alaskan River Boats.

SPECIFY
CRANE VALVES
WRITE FOR POCKET CATALOGUE
NEW YORK
PHILADELPHIA
CINCINNATI
KANSAS CITY
SIOUX CITY
OMAHA
CRANE CO.
CHICAGO
ESTABLISHED 1855
ST. PAUL
ST. LOUIS
LOS ANGELES
SAN FRANCISCO
PORTLAND, ORE.

Patterson's Nautical Encyclopedia.

Will be in all respects a work up to date, correct as to every term known to the shipping world.

Divided as to departments of Naval Architecture, Marine Engineering, etc.

The latest and bound to be the most complete work of its kind. Best effort of Howard L. Patterson, New York, author of several standard books on marine subjects.

NOW IN PRESS. $3 PER COPY.

Order from THE MARINE REVIEW PUB. CO., CLEVELAND.

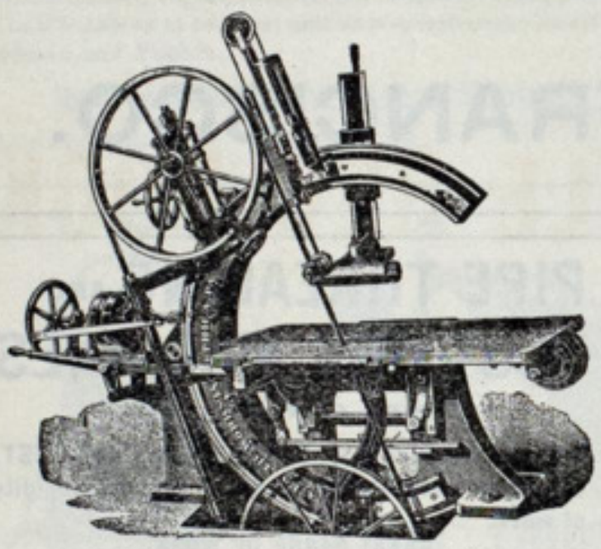
WILSON & SILSBY, Rowe's Wharf, BOSTON, MASS.

We furnished the Sails for
DEFENDER,
COLONIA,
JUBILEE,
NAVAHOE.

PARTICULAR ATTENTION GIVEN TO
SAILS FOR RACING YACHTS.
ALSO THE
OUTFITS OF LARGE STEAM YACHTS.

THE CHASE MACHINE COMPANY,
Engineers and Machinists,
MANUFACTURERS, UNDER THE CHASE PATENTS OF
FOG WHISTLE MACHINES, HOISTING ENGINES,
STEERING ENGINES, AUTOMATIC TOWING ENGINES.
POWER AND DROP HAMMERS, AND OTHER MACHINERY
ENGINEERS' SUPPLIES, AND GENERAL JOB WORK.
TELEPHONE MAIN 994. 111 Elm Street CLEVELAND, OHIO.

Howard H. Baker & Co.
SHIP CHANDLERS
AND SAIL MAKERS,
18 to 26 Terrace, BUFFALO, N. Y.



ADJUSTABLE BEVEL BAND SAW.

Will bevel both ways to 45 degrees.
Power movement to change angles.
Power feed in three directions.

ESTABLISHED 1869. INCORPORATED 1896.

ATLANTIC WORKS INCORPORATED,

Successors to Berry & Orton Company.

2223-25-27 & 29 Arch St., PHILADELPHIA, PA., U. S. A.

MANUFACTURRS OF

MACHINERY FOR WORKING WOOD FOR USE IN SHIP YARDS, CAR SHOPS, RAILROAD SHOPS.

SEND FOR CATALOGUE. ESTIMATES FURNISHED.

Hollow Chisel Mortisers. Car Sill Dressers.

Westinghouse Fan Motors

Quiet Running. Diameter of Fans 13 inch. Refreshing Breeze.

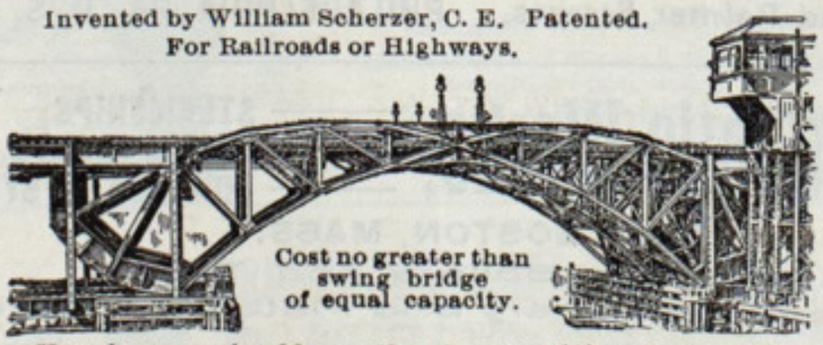
Westinghouse Electric
& Mfg. Co. Pittsburg, Pa.

All Principal Cities in U. S. and Canada.

71 T

THE SCHERZER ROLLING LIFT BRIDGES

Invented by William Scherzer, C. E. Patented.
For Railroads or Highways.



Cost no greater than swing bridge of equal capacity.

Opened or Closed in Twenty Seconds.

Vessel owners should urge the adoption of these bridges. The 8-track Scherzer Bridge over the Chicago Drainage Canal is the largest movable bridge in the world. A number in SUCCESSFUL operation, and several in process of construction.

SCHERZER ROLLING LIFT BRIDGE CO.,
1616 Monadnock Block, Chicago, Ill.

TRY IT ON YOUR BOAT.

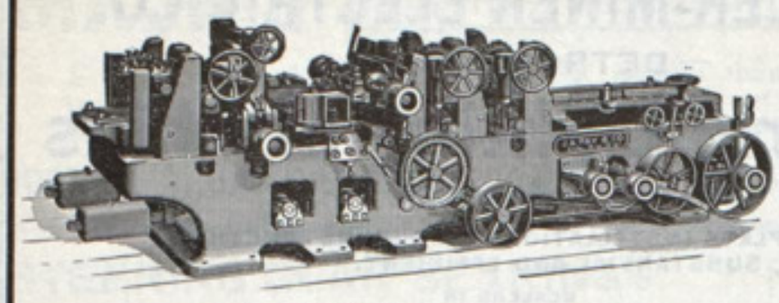
A genuine Varnish Paint without gum. Where applied the surface becomes coated as with glass, resisting the influence of weather and of water (salt or fresh) and keeping its gloss for years.

JOHN MAIR & SON. 136 S. Delaware Ave., PHILADELPHIA, PA.

CLEVELAND CITY FORGE & IRON CO.

CLEVELAND, O.

IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.



No. 15 LIGHTNING FLOORER.

Patented March 20, 1900.

Will plane 4 sides, 9 to 14 inches wide and 6 inches thick.

The feed consists of six rolls 8″ in diameter, very powerful.

Wood-Working Machinery

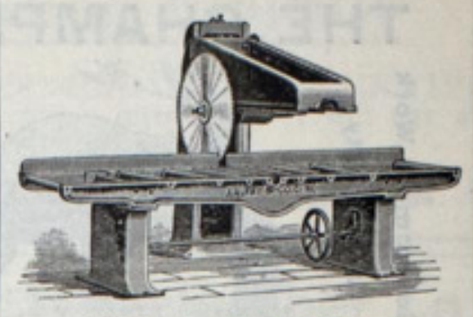
ESPECIALLY ADAPTED FOR SHIP BUILDING AND NAVY YARDS.

"GRAND PRIX" PARIS 1900.

SINGLE MACHINES.
COMPLETE EQUIPMENTS.

J. A. FAY & EGAN CO.,

325-345 W. Front St., CINCINNATI, O.



WALL BRACKET CUTTING OFF SAW.

Used for sawing to accurate dimensions the heaviest timbers required in Ship and Navy Yards. Will cut 30″ wide and 12″ thick.

Thearle's Works ON SHIP BUILDING.

STANDARDS IN ENGLAND AND SCOTLAND

KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel." (Plates in separate volume.) $5.25.
"Ship Building and Laying Off." (Plates in separate volume.) $3.00.
"Theoretical Naval Architecture." (Plates in separate volume.) $3.50.
"Practical Naval Architecture." (Two volumes.) $3.00.

THE MARINE REVIEW PUB. CO., CLEVELAND.

Illustrated Nautical Encyclopedia.

A WORK IN ALL RESPECTS UP TO DATE.

By HOWARD PATTERSON, Principal of New York Nautical College.

ORDER NOW. IT IS IN PRESS.

Not a Dictionary of Sea Terms alone. It is complete from the standpoint of the Naval Architect and Marine Engineer.

PUBLISHED BY
The Marine Review Pub. Co., Cleveland, O.

ARE YOU AWARE THAT

Crandall's Modern Marine Railways

are the most ideal form of dry dock for working on a ship's bottom?

SAFE. RAPID. COMPLETELY EQUIPPED.

H. I. CRANDALL & SON,

Engineers and Builders,

100 Border Street, EAST BOSTON, MASS.

AMERICAN LINE

NEW YORK
SOUTHAMPTON
LONDON

CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Wednesday at 10 A. M.

Steamers: ST LOUIS, ST PAUL, NEW YORK, PHILADELPHIA.

Special Express Train from **Southampton** to **London** in one hour and forty minutes.
Close connection at SOUTHAMPTON for **Havre** and **Paris** by special fast twin-screw Channel Steamers.

RED STAR LINE

NEW YORK
ANTWERP
. . . . PARIS

Sailing Every Wednesday at 12 Noon.

Steamers: { **VADERLAND, *ZEELAND, KENSINGTON, SOUTHWARK, FRIESLAND.*

* New Twin-screw Steamers calling at Cherbourg eastbound.

One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE, GERMANY, THE RHINE, SWITZERLAND and ITALY.

Send for "Facts for Travelers." **International Navigation Company**

Empire Building, 73 Broadway, New York.

305-307 Walnut St., Philadelphia.
Fiske Building, 89 State Street, Boston.
1306 F St., N.W., Washington, D. C.
Cor. Dearborn & Washington Sts., Chicago.
Third and Pine Streets, St. Louis.
10-12-14 Washington Ave., S., Minneapolis.
30 Montgomery St., San Francisco.

PIERS: 14 & 15 NORTH RIVER, FOOT OF FULTON ST., NEW YORK.

THE LITTLE RED BOOK

OF APPOINTMENTS OF CAPTAINS AND ENGINEERS.

THINK of the name of a lake ship, glance at the index in this little book, and you will not only find the name and address of the owner, with captain and engineer, but also the names of other vessels of the same fleet.

FOR the convenience of vessel owners, captains and engineers, there is also printed in the Little Red Book a list of ship chandlers, grocers, meat markets and other concerns on the lakes supplying vessels.

EVERYBODY who has anything to do with ships carries a Little Red Book in his vest pocket. Occasion to refer to it every day.

PRICE, $1. THE MARINE REVIEW PUB. CO., CLEVELAND.

ELECTRIC AUTOMATIC WHISTLE OPERATOR

will operate whistle from any distance with ease and certainty.

WHISTLE BLAST RECORDERS will prove invaluable in cases of collision or grounding through crowding or other causes. **STEAM SHIP WHISTLES** in all sizes to operate with steam or air. It will pay you to investigate our novel improvements. Catalogues mailed to captains, owners or engineers, upon application.

THE SIGNAL & CONTROL CO., 24-27 WEST STREET NEW YORK, U. S. A

Chas. E. & W. F. Peck,

58 WILLIAM STREET, NEW YORK CITY.
ROYAL INSURANCE BLDG, CHICAGO, ILL.

INSURANCE

ALL CLASSES OF MARINE INSURANCE,
BOTH CARGOES AND HULLS.

GREAT LAKES REGISTER

INCORPORATED

COMBINED AND ISSUED IN CONNECTION WITH THE

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

GREAT LAKES REGISTER DESIRES TO ANNOUNCE THAT ITS RATINGS GO BEFORE THE LEADING UNDERWRITERS OF AMERICA ENGLAND AND FRANCE.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES.

F. D. HERRIMAN, SURVEYOR GENERAL,
320-322 PERRY-PAYNE BUILDING, CLEVELAND O

THE CHAMPION RIVET CO.

Government Work a Specialty

Quality: Highest Standard. Finish: Unexcelled.

CLEVELAND, O., U. S. A.

VICTOR BOILER AND STRUCTURAL RIVETS.

SEIDLER-MINER ELECTRIC CO.

DETROIT, MICH.

Electric Lighting of Ships

OUR SPECIALTY.

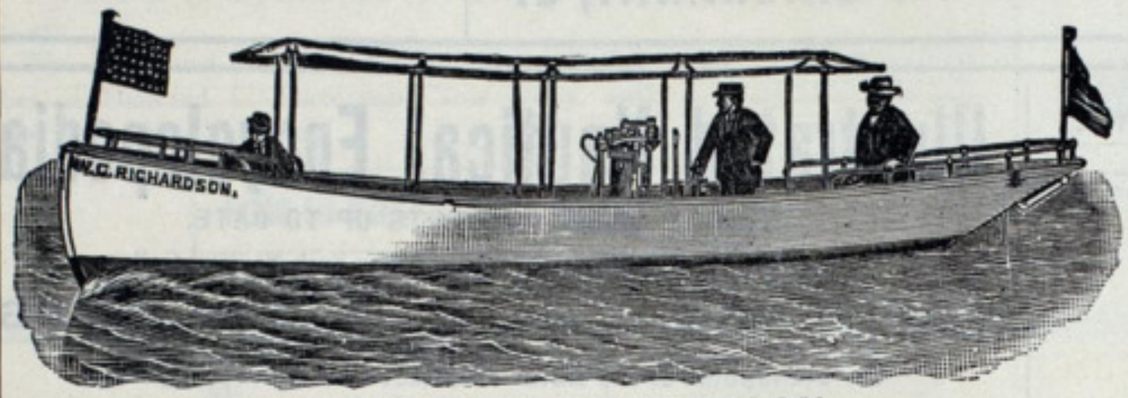
COMPLETE INSTALLATIONS OR RECONSTRUCTION, SAFE, SUBSTANTIAL AND EFFICIENT.

DEALERS IN

Marine Electrical Supplies AND Special Fittings.

Catalogue and Marine Rules on application.

THE "WOOTTERS" GASOLINE MARINE ENGINES



Launch W. C. RICHARDSON.

Built for Hausheer & Sons, Cleveland, O. Dimensions, 35 x 8 O. A. Engine 8 horse power.

ALWAYS RELIABLE.

Especially adapted for Launches, Fish Tugs and Ferry Boats.

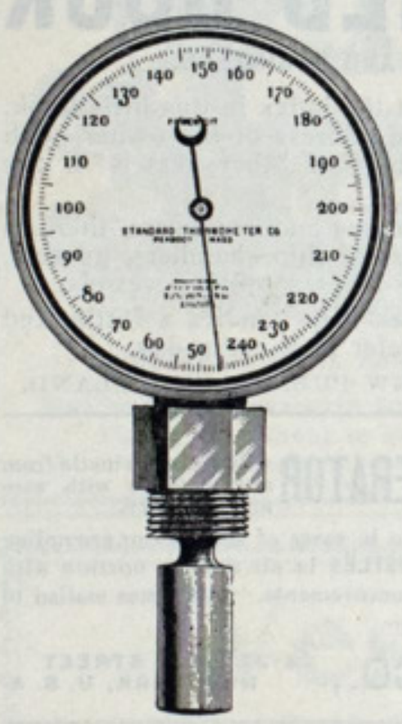
Catalogue, Prices and Particulars furnished on application.

Engines of the Stationary Type built suitable for all purposes requiring from 4 to 100 horse power, where a reliable and efficient power is required.

ENGINES BUILT BY

THE McMYLER MANUFACTURING CO.,

180 Columbus Street, CLEVELAND, O.



Helios-Upton Comp'y,

PEABODY, MASS.

Hot Water Thermometers and Thermometers for Mechanical Purposes.

Used by U. S. Navy in all New Ships.

Eighty of them furnished the Japanese Cruisers "Kasagi" and "Chitose."

SEND FOR BULLETIN No. 40 A.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-Preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.
ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

DELTA METAL

REG TRADE MARKS "Phosphor-Bronze" DELTA

THE PHOSPHOR BRONZE SMELTING CO. LIMITED, 2200 WASHINGTON AVE., PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
—DELTA METAL—
CASTINGS. STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U.S.

PROPELLERS.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank,

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, O.

MacKinnon Manufacturing Co.

Boilers Makers, Founders and Machinists.

Marine Boilers, Engines and Shipyard Machinery. Most powerful set of Hydraulic Slings on the Lakes. Best Towing and Speed Propeller Wheels made.

SPECIALTY SMALL YACHT WHEELS.

Works and Office, 224-230 N. Water Street, BAY CITY, MICH.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

DIXON'S GRAPHITE PIPE JOINT COMPOUND

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY, N. J.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY, N. J.

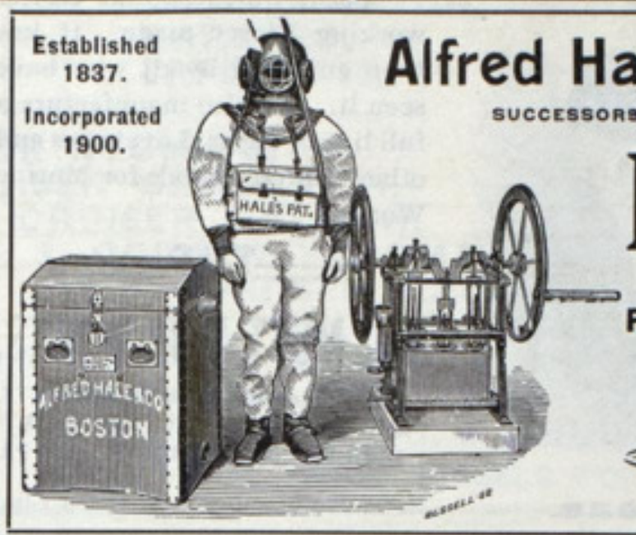
STEERING GEAR BEARINGS,
AMMUNITION HOIST BEARINGS,
CAPSTAN BEARINGS,
WINDLASS AND WINCH BEARINGS,

REQUIRING NO OILING OR GREASING.

Also Anchor, Davit and Cargo Block Bushings,
Bushings for Sheaves on Wrecking Derricks,
Washers and Collars for Thrust Bearings.

THE GRAPHITE LUBRICATING CO.,
BOUND BROOK, N. J., U. S. A.

Established 1837.
Incorporated 1900.



Alfred Hale Rubber Co.

SUCCESSORS TO ALFRED HALE & CO

DIVING APPARATUS
OUR SPECIALTY.

Repair Cloth.
Rubber Cement.

OFFICE AND FACTORY:
387 E. Eighth St.,
SO. BOSTON, MASS.

Pure Feed Water.
Clean Boilers.
Lower Fuel Bills.

Reynolds Feed Water Heater and Purifier

Suited to both Marine and Stationary Boilers.

Prevents formation of scale, removes old scale, and reduces fuel bills.

In use on a number of steam vessels on the Great Lakes.

H. J REYNOLDS,
721 PERRY-PAYNE BLDG.,
CLEVELAND, O.

THE MARINE DEPARTMENT

of the Geo. F. Blake Mfg. Co. take pleasure in announcing that they were awarded the Grand Prix at the recent Exposition at Paris, for their special exhibit of Marine Pumps, Condensers, etc.

Send for new Catalogue of Marine Specialties.

THE GEO. F. BLAKE MFG. CO., 91 Liberty St., N. Y. City.

HENRY R. WORTHINGTON, PUMPING MACHINERY.

MARINE AIR AND FEED PUMPS
A SPECIALTY.
WATER METERS.

BOSTON. CHICAGO. PHILADELPHIA. ST. LOUIS. BUTTE.
CLEVELAND. PITTSBURG. ATLANTA. SAN FRANCISCO NEW ORLEANS.

120 Liberty St., NEW YORK.

NEW PATENT
STOCKLESS ANCHOR

MADE BY THE
International Anchor Co.

Catalogues Mailed Upon Application.

CLEVELAND, O.
BINGHAMTON, N.Y.

ELASTIC SEAM-COMPOSITION

TRADE MARK

For Decks and all other Seams,
Weather Checks,
Floors, Skylights, Etc.

AND ELASTIC SEAM PAINT
WHITE, BLACK AND COLORS,
IS BEING USED BY

U. S. ARMY TRANSPORTS,
OCEAN STEAMSHIP CO.,
FIRE BOAT NEW YORKER,
L. BOYER'S SON'S TRANSPORTATION CO.,
NEW YORK & CUBA MAIL STEAMSHIP CO.,
MERRITT & CHAPMAN D. & W. CO.
AMERICAN LINE,
WARD LINE,
ATLAS LINE,
OLD DOMINION STEAMSHIP CO.,
PANAMA RAILROAD STEAMSHIP CO.
PENNSYLVANIA RAILROAD CO., Etc.

TO BE BOUGHT OF
Anthony S. Morse, 210 Commercial St., Boston.
Cook & Co., Tacoma, Wash.
Jennison Hardware Co., Bay City, Mich.
J. F. Donahue & Co., Sandusky, O.
The Chas. F. Beebe Co., Portland, Ore.
Geo. B. Carpenter & Co., Chicago, Ill.
Elisha Webb & Sons, 108 S. Delaware, Philadelphia.
H. Steffens, 337-339 Fell St., Baltimore.

And all marine hardware stores in New York and Brooklyn.

Samples sent on receipt of 30 cents in stamps. An agent wanted in each seaport town.

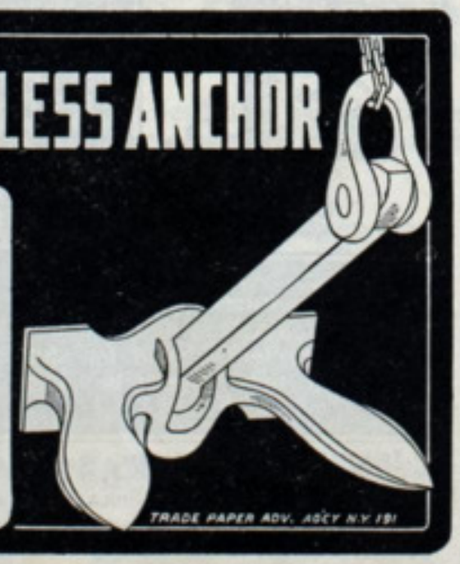
COLE & KUHLS, Sole Manufacturers,
Office and Factory, foot of 24th St. [Mention this Paper.] BROOKLYN, N. Y.

BALDT PATENT STOCKLESS ANCHOR

Made of the finest quality of open-hearth steel, and constructed on the ball and socket principle. Many points of superiority over ordinary stockless anchors.

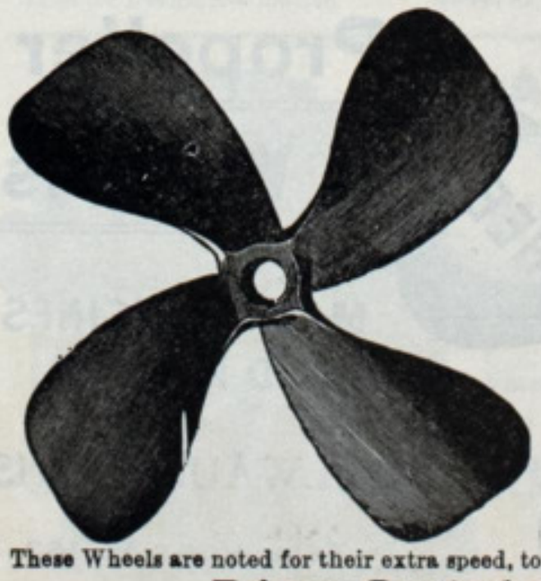
BALDT ANCHOR COMPANY,
CHESTER, PA.
WALTER MILLER, PERRY-PAYNE BUILDING, CLEVELAND, O.

Representative for the Great Lakes. We keep a large number of Anchors in stock.



H. G. TROUT,
KING IRON WORKS,
BUFFALO, N. Y.

MANUFACTURERS OF



TRIPLE EXPANSION, FORE-AND-AFT AND STEEPLE COMPOUND MARINE ENGINES,

High and Low Pressure Engines,
Sectional Propellers,
Tug and Yacht Wheels.

Cowles Aluminum and Manganese Bronze Propeller Wheels.

These Wheels are noted for their extra speed, towing power and proportionate saving of coal.

Prices Quoted on Application.

Mott's "Richmond" Pump Closet.

THE "Richmond" is the simplest, quickest and easiest working Closet made. It has been endorsed by all who have seen it. We also manufacture a full line of Baths, Lavatories and other Sanitary goods for Marine Work.

THE
J. L. MOTT IRON WORKS,
84-90 Beekman St., NEW YORK CITY.
378 Boylston St., BOSTON, MASS.
1128 Walnut St,, PHILADELPHIA, PA.

Send for Circular and Price List.

Established 1828.

THE TOPOPHONE

$25.00

Prevents Marine Disasters in Fogs.

Write for circular to

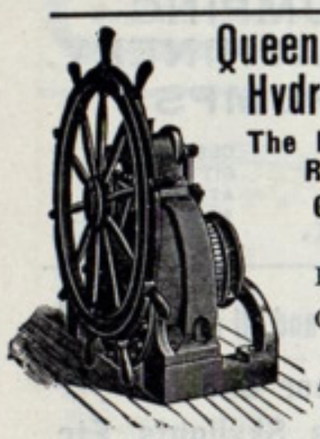
J. B. COLT CO.,
Room 7, 21 Barclay St., N. Y.

SIXTH REVISED EDITION.

Scott's Coast Pilot for 1901.

Great Lakes and Connecting Waters,
AT $1.50.
For sale by MARINE REVIEW PUB. CO.

Queen City Patent Hydraulic Steerer.



The Best and Most Reliable.
Generates No Heat In Pilot House.
Has Large Hand Wheel.
Can be Changed from Power to Hand Steering Instantly.
A Favorite with Pilots.
Send for References.

Queen City Engineering Co., Buffalo, N. Y.

ALFRED B. SANDS & SON

MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties.

Marine Water Closet for either above or below water line.
Folding Lavatories, Ventilators, Pumps, Tanks, &c., &c.

134 BEEKMAN ST., NEW YORK.

MARINE CHAIN

OF ALL KINDS.

Ships Cables, Dredge Chains,
Stud Link and Marine Railway Chains,
Steam Shovel Chains, Boom Chains, Etc.

CERTIFICATE OF TEST FURNISHED.

STANDARD CHAIN CO.

PITTSBURGH, PA.

THE LIDGERWOOD-MILLER-MARINE CABLEWAY

WILL TRANSFER COAL, AMMUNITION, SUPPLIES AND PROVISIONS, FROM SHIP TO SHIP AT SEA.

THE ONLY PRACTICAL DEVICE FOR COALING AT SEA.

LIDGERWOOD STEAM AND ELECTRIC HOISTS FOR WAR VESSELS, STEAMSHIPS, WAREHOUSES AND DOCKS. Send for Catalogue.

LIDGERWOOD MFG. CO., 96 LIBERTY ST., NEW YORK.

Bureau of Shipping Information.

Such is the office of the Marine Review, Cleveland. We try to keep in touch with all that is going on among ship owners and ship builders and never tire of answering inquiry on this score from advertising patrons. Write us.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.

SHERIFFS MANUFACTURING COMPANY

MANUFACTURERS OF

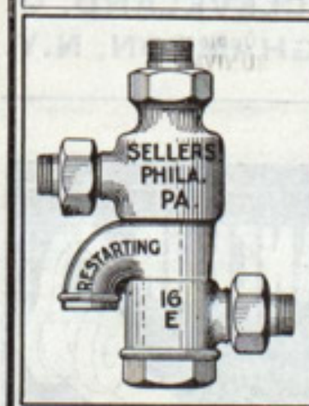
Propeller Wheels.

MARINE ENGINES AND REPAIRS.

MILWAUKEE, WIS.

TELEPHONE S.–163

Sellers' Restarting Injector



A strictly first class machine at moderate cost.

Perfectly automatic, has wide range of capacities, and raises water promptly with hot or cold pipes.

Very simple, has few parts and is easily repaired.

All parts interchangeable, made of the best bronze, and the workmanship is perfect. Send for special catalogue descriptive of this Injector.

JENKINS BROTHERS, Selling Agents
NEW YORK, BOSTON, PHILA., CHICAGO

CHAS. CORY & SON,

Manufacturers of the
Mechanical and Electric Marine Telegraph,

Electrical Helm Indicators
Electric Call Bells.

Engine Bells and Brass Work of all descriptions, Shrieking and Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

THE BABCOCK & WILCOX CO.

HAVE EQUIPPED THE FOLLOWING LAKE VESSELS WITH THEIR FORGED STEEL WATER TUBE BOILERS:

ZENITH CITY,
QUEEN CITY,
EDNA G.,
CRESCENT CITY,
SUPERIOR CITY,
EMPIRE CITY,
ALEX McDOUGALL,
PRESQUE ISLE,
MATAAFA,
MAUNALOA,
MALIETOA,
JOHN W. GATES,
JAMES J. HILL,
ISAAC L. ELLWOOD,
WM. EDENBORN,
W. S. GRATTAN,
HARVARD,
LAFAYETTE,
CORNELL,
PRINCETON,
RENSSELAER,
PARAGUAY,
ASUNCION.

BOILERS NOW UNDER CONSTRUCTION FOR U. S. MONITOR WYOMING,
U. S. CRUISER CINCINNATI,
U. S. CRUISER RALEIGH,
U. S. CRUISER TACOMA,
U. S. CRUISER GALVESTON,
U. S. CRUISER CHATTANOOGA,
U. S. CRUISER DENVER,
U. S. CRUISER DES MOINES,
U. S. CRUISER CLEVELAND,
AND SEVERAL LARGE VESSELS FOR THE PACIFIC COAST.

The Babcock & Wilcox Co.,

29 CORTLANDT ST.,

NEW YORK.

THE BUFFALO DRY DOCK CO.

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-ton Shear Legs, and in every way Equipped

WITH MODERN MACHINERY FOR

Prompt and Economical Repairs

AND FOR THE BUILDING OF STEEL AND WOODEN SHIPS.

OFFICE, GANSON ST., TELEPHONE 515 SENECA.

Edward Smith, President, Tel. 279 Seneca.
Edward Smith, Residence Tel. 209 Bryant.

Geo. B. Drake, Ass't to President, Residence Tel. 798 Bryant.

THE ROBERTS BOILER CO.

HAS BUILT OVER 1000 BOILERS TO DATE

For Launches, Yachts, Passenger and Freight Steamers,
Dredges, Tugs, Stern-wheelers, Canalers;
Also for Navy Department, War Department, Treasury Department,
Light-House Board and Revenue Cutter Service;
Also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

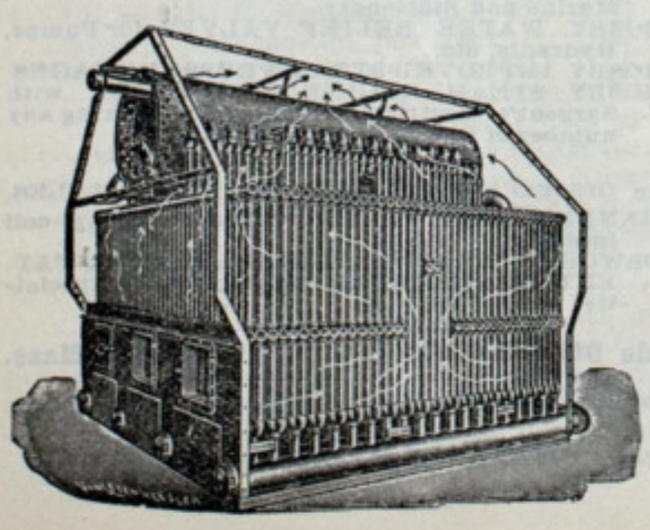
NEVER KILLED A MAN OR HAD A SERIOUS ACCIDENT. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every boiler warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,

Works, Red Bank, N. J. 39 and 41 Cortlandt St., NEW YORK CITY.

TELEPHONE: { NEW YORK OFFICE, 599 CORTLANDT. / OFFICE OF WORKS, 49 RED BANK, N. J. } Cable Address, "BRUNIVA, NEWYORK."

THE "TAYLOR" YACHT BOILER



Has held the record three seasons on the fastest yacht on the great lakes.

Guaranteed against Rupture of Tubes.

Will not Prime in the Roughest Sea.

MANUFACTURED BY

Detroit Screw Works,

FOOT OF REOPELLE ST.,

DETROIT, MICH., U. S. A.

ALL THE NAVIES OF THE LEADING GOVERNMENTS OF THE WORLD USE

The Niclausse Water Tube Boiler,

ADOPTED BY THE NAVIES OF

UNITED STATES, RUSSIA, SPAIN,
ENGLAND, ITALY, Argentine Republic,
FRANCE, GERMANY, CHILI.

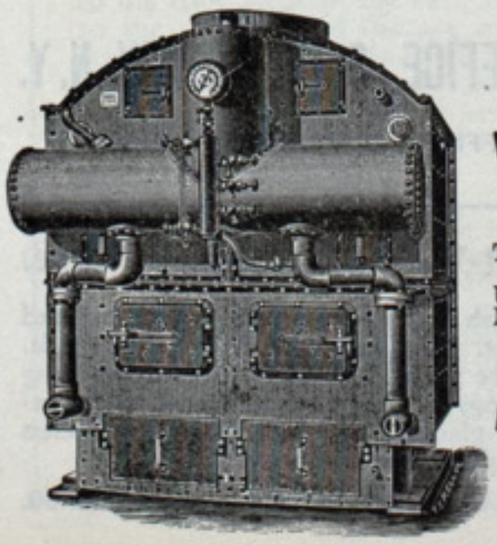
We have now in course of construction at our Works 60,000 H. P. Niclausse Boilers for the following war vessels:

U. S. Monitor CONNECTICUT, { Building at the Ship Yard of the Bat Iron Works, Bath, Me.

U. S. Battleship MAINE,
Russian Battleship RETVIZAN,
Russian Cruiser VARIAG, { Building at Wm. Cramp & Sons Ship Yards, Philadelphia.

THE STIRLING COMPANY,

Write for Descriptive Matter. General Offices Pullman Building, Chicago, Ill.



ALMY'S PATENT

SECTIONAL

Water Tube Boilers.

NOW USED IN

Thirty Passenger Boats and 100 Steam Yachts ranging from 50 to 250 feet in length,
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boiler also giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

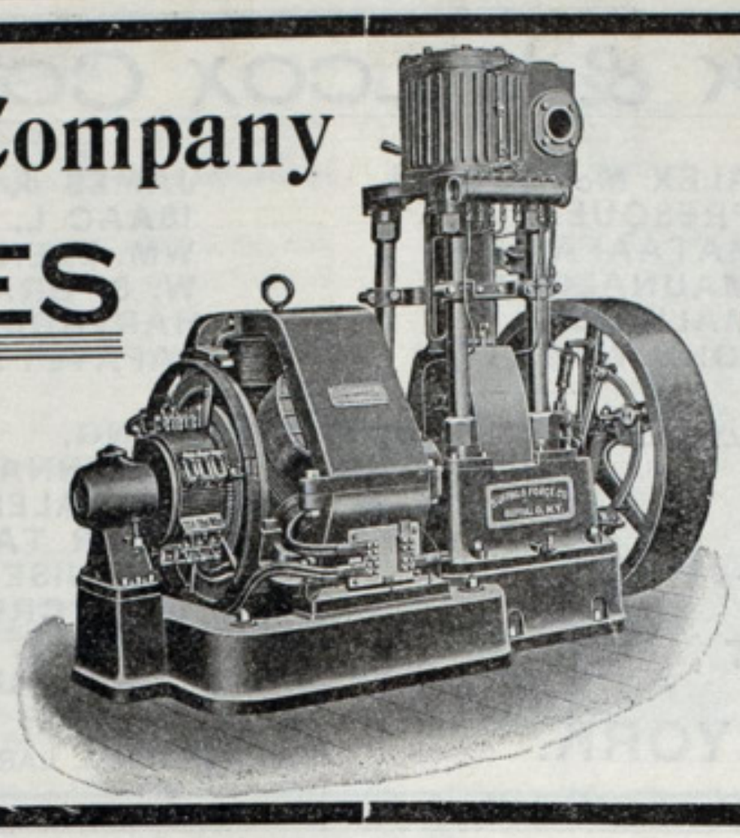
178-184 Allens Avenue,
near Rhodes St.

PROVIDENCE, R. .

Buffalo Forge Company

ENGINES

FOR
MARINE
LICHTING SETS



COMPACTNESS
DURABILITY
ECONOMY
ACCESSIBILITY

Buffalo Forge Company,
BUFFALO, N. Y.

The Shipowners Dry Dock Co.

CHICAGO.

Repairs to Steel and Wooden Vessels.

Three Docks at Halsted Street and North Branch.

OFFICES, 21 AND 23 SHERMAN STREET.

OFFICE TELEPHONE, HARRISON 1020.
YARD TELEPHONE, NORTH 759.

W. W. WATTERSON, SUPT.

ASHTON

CAM LEVER POP SAFETY VALVES
AND NON-CORROSIVE STEAM GAGES
give highest efficiency and durability. Specify them and get the best.

THE ASHTON VALVE CO., BOSTON, NEW YORK AND CHICAGO, U. S. A.

GENERAL ELECTRIC COMPANY'S Projectors.

HAND, PILOT-HOUSE OR ELECTRICAL CONTROL.

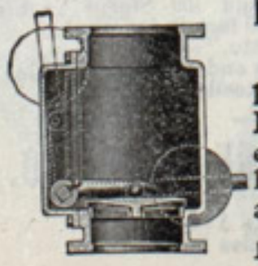
Operated from direct-current incandescent lamp circuits.

Write for Catalogue No. 1025.

GENERAL OFFICE, SCHENECTADY, N. Y.

SALES OFFICES IN ALL LARGE CITIES.

13-INCH PROJECTOR. HAND CONTROL.



Excelsior Straight-Way Back Pressure Valve.

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well-made. Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

JENKINS BROTHERS. NEW YORK. PHILADELPHIA, BOSTON, CHICAGO.

THE BOURNE-FULLER CO.

CLEVELAND O.

BAR IRON. PIG IRON.

ARCHES AND STRAPS FOR WOODEN VESSELS.

BOILER RIVETS. BOILER TUBES. BRACE IRON.
IRON AND STEEL SHEETS. MACHINERY AND TOOL STEEL.
BESSEMER AND OPEN HEARTH STEEL.
SHIP PLATES, BOILER PLATES, SHIP RIVETS.
BEAMS, CHANNELS, ANGLES, BARS, AND OTHER SHAPES.
BILLETS, BLOOMS AND FORGINGS.
"BYERS" FULL WEIGHT WROUGHT IRON PIPE.

CROSBY STEAM GAGE AND VALVE CO.

CROSBY POP SAFETY VALVES, Locomotive, Marine and Stationary.
CROSBY WATER RELIEF VALVES, for Pumps, Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES
CROSBY STEAM ENGINE INDICATORS, with Sargent's Electrical Attachment for taking any number of Diagrams simultaneously.

The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil insertion.
BOSWORTH FEED-WATER REGULATOR, PATENT GAGE TESTER, and many other specialties in Steam Lines.

Main Office and Works: Boston, Mass.

Stores; Boston, New York, Chicago, and London Eng.

WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.